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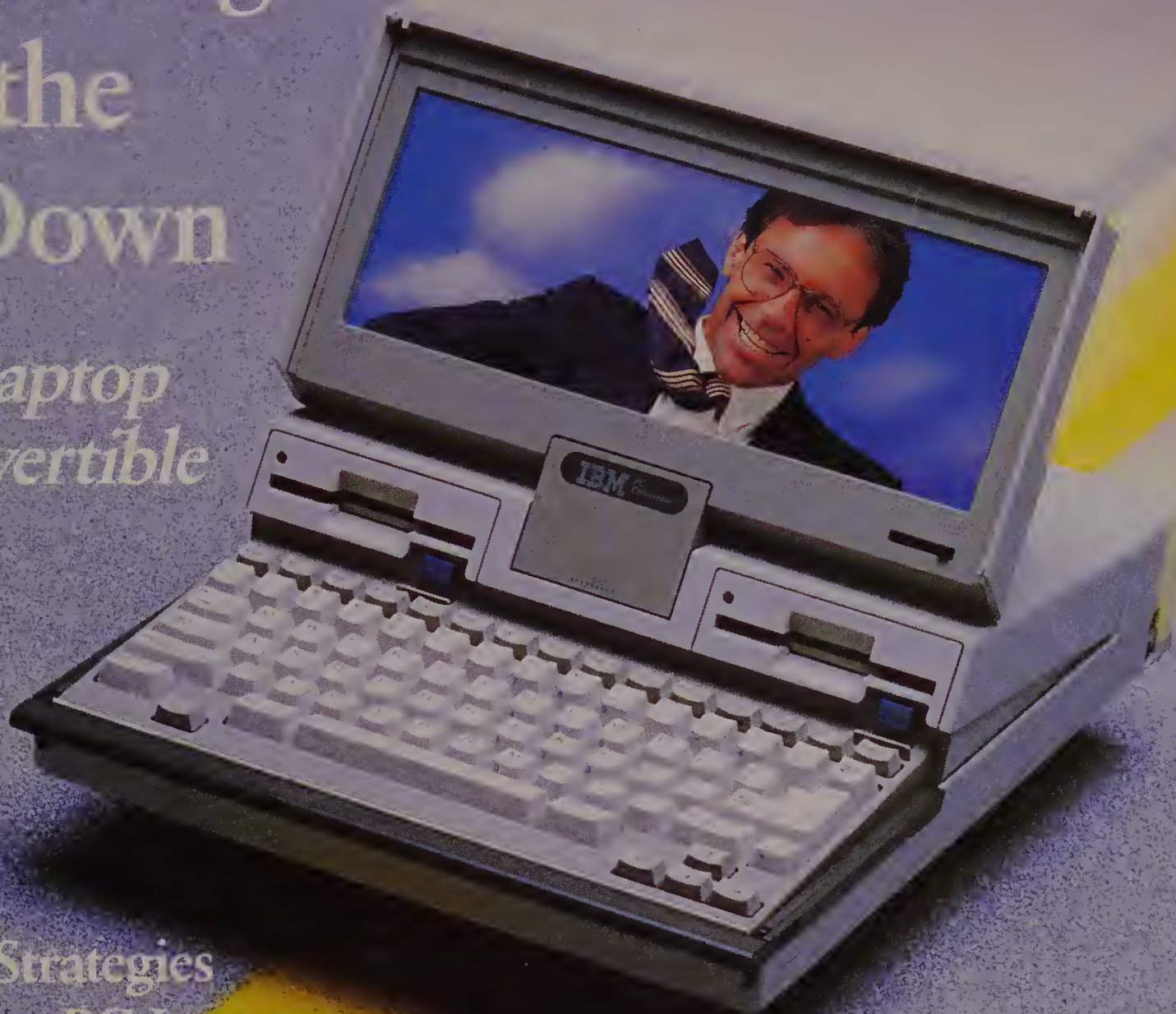

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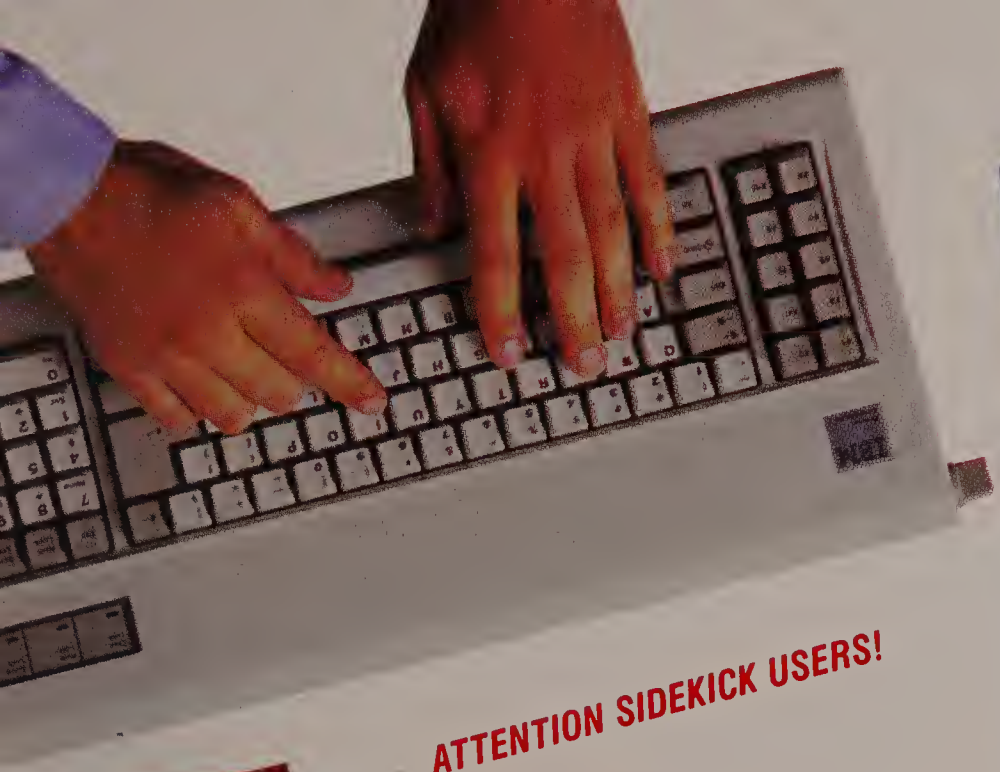

ATTENTION SIDEKICK USERS!

SuperKey®

If you use SideKick, you need SuperKey. They're designed to work together—and work for you. SuperKey's an amazing keyboard enhancer for your IBM®PC and compatibles. With easy-to-write macros, you and SuperKey can turn 1000 keystrokes into 1. SuperKey also includes powerful encryption technology (so powerful that the U.S. Government restricts the export of SuperKey) that can scramble your files and keep confidential files absolutely confidential. Unless you tell someone your secret password, no one else can get into your files for any good or not-so-good reason. SuperKey's macros put an end to keystroke repetition, and encryption puts an end to any security risk. Suggested retail: $69.95.

Borland's Programming Languages and Toolboxes:

Turbo Pascal® 3.0 High-speed Pascal compiler and integrated programming environment.

Turbo Tutor® 2.0 Basic through advanced Turbo Pascal programming concepts and techniques.

Turbo Graphix Toolbox™ High resolution graphics for Turbo Pascal.

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Turbo Editor Toolbox™ Word processor construction set for Turbo Pascal.

Turbo GameWorks™ Chess, Bridge, and Go-Moku in Turbo Pascal.

Artificial Intelligence:

Turbo Prolog™ High-speed compiler for Prolog, the 5th-generation Artificial Intelligence language.

SideKick®

Powerful desktop management program and the #1 best seller for the IBM PC. SideKick includes notepad, calendar, calculator, appointment scheduler, telephone directory, autodialer, and ASCII table. It's "RAM-resident," which means SideKick is always there ready to react when you need to do something, call someone, or find out something in a hurry. And it does all this *while you run* other programs. It acts just like the old Western movie "sidekicks" it was named after—it's always there to help, but it never gets you into bar fights in the saloon. *InfoWorld* named SideKick "Product of the Year" in '85 and *PC World's* William Urschel recently wrote that "*Borland's SideKick continues to be the most popular.*" Suggested retail: copy protected $54.95; not copy protected $84.95.

Notepad and Calculator Window over Lotus 1-2-3®

Technical Specifications:

TURBO PASCAL 3.0 Minimum memory: 128K; includes 8087 and BCO features for 16-bit MS-OOS and CP/M-B6 systems. CP/M-B0 version minimum memory: 48K; 8087 and BCO features not available.

TURBO DATABASE TOOLBOX Minimum memory: 12BK. CP/M-B0 minimum memory: 48K. Requires Turbo Pascal 2.0 or later.

TURBO GRAPHIX TOOLBOX* Minimum memory: 192K. Requires PC/MS-OOS 2.0 or later, Turbo Pascal 3.0, and IBM CGA, Hercules Monochrome Card or equivalent.

TURBO TUTOR 2.0 Minimum memory: 192K. CP/M-B0 version minimum memory 4BK. Requires PC/MS-OOS 2.0 or later and Turbo Pascal 3.0.

TURBO EDITOR TOOLBOX* Minimum memory: 192K. Requires PC/MS-OOS 2.0 or later and Turbo Pascal 3.0.

TURBO GAMEWORKS* Minimum memory: 192K. Requires PC/MS-OOS 2.0 or later and Turbo Pascal 3.0.

TURBO PROLOG* Minimum memory: 384K.

REFLEX: THE ANALYST* Minimum memory: 384K. Requires IBM CGA, Hercules Monochrome Card or equivalent. Works with Intel's AboveBoard-PC and -AT; AST's RAMpage! and RAMpage! AT; Quadram's Liberty-PC and -AT; Tecmar's 640 Plus; IBM's EGA and 3270/PC; AT&T's 6300 and many others.

REFLEX WORKSHOP* Minimum memory: 384K. Requires Reflex: The Analyst. Two disk drives or hard disk recommended.

TURBO LIGHTNING* Minimum memory: 256K. Two disk drives required. Hard disk recommended.

LIGHTNING WORD WIZARD* Minimum memory: 256K. Requires Turbo Lightning. Turbo Pascal 3.0 required to edit source code.

SIDEKICK* Minimum memory: 128K.

TRAVELING SIDEKICK* Minimum memory: 256K.

SUPERKEY* Minimum memory: 128K.

*For IBM PC, AT, XT, PCjr and true compatibles only, running PC/MS-DOS 2.0 or fater.

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Traveling SideKick™

"Traveling SideKick could become as useful to you on the road as SideKick is at your desk," says Jim Bartimo of *Personal Computing*, and we're happy to agree.

Traveling SideKick is your SideKick's sidekick, and an electronic version of the familar diaries, time-managers, and daytime organizers that are so popular.

Traveling SideKick is BinderWare™ that includes an organizer, a binder, a software program, and a Report Generator that taps into your SideKick files and prints them out in convenient, portable form. Your appointments can be produced in daily/weekly/monthly/yearly calendars. You can also reproduce your phone list, client list, and mailing list and take them with you. Traveling SideKick is the smart new way to take your computer with you, without taking your computer with you. It's an attractive, professional-looking binder and a modern business tool that you can take around the world or just home for the night or weekend. There's nothing else like it; Traveling SideKick is quite unique—just like you. It's electronic, so unlike traditional record-keepers, it doesn't "expire" at the end of any calendar year. Suggested retail: $69.95.

Turbo Lightning™

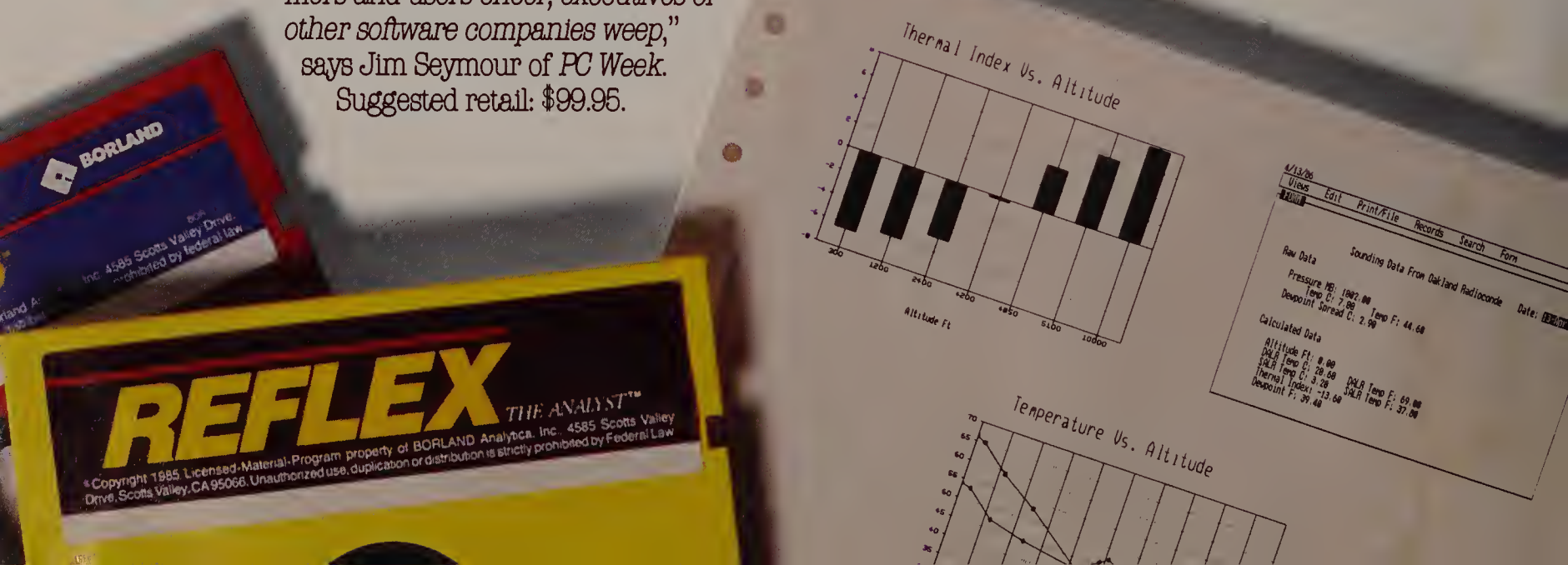
While you use SideKick, Reflex, MultiMate,™ WordPerfect,® Microsoft,® Word, 1-2-3, and most popular programs, Turbo Lightning proofreads *as you write!* You can rely on Turbo Lightning to save you from embarrassing typos and horrorbull spelling while you do your letters, worksheets, or databases.

Lightning's a revolutionary new software program and the forerunner of a complete Electronic Reference Library. It includes the 80,000-word Random House® Concise Dictionary and the 50,000-word Random House Thesaurus. (If you use electronic mail services like MCI,℠ CompuServe,® BIX® or The Source,℠ Lightning will check your spelling on-line and save you from those unfortunate typos which tell a huge electronic audience that you can't spell for nutz!) The thesaurus, meanwhile, gives you instant synonyms—your vocabulary gets better all the time. *"Lightning's good enough to make programmers and users cheer, executives of other software companies weep,"* says Jim Seymour of *PC Week*. Suggested retail: $99.95.

Lightning Word Wizard™

An important addition to Turbo Lightning, Lightning Word Wizard includes fascinating and challenging word games like "Akerue" (try reading that backwards), "That's Rite," "CodeCracker," "CrossSolver," "MixUp," and "FixUp," to name some of them. With CrossSolver, mind-benders like the New York Times crossword puzzle are demystified, solved, and your sanity saved. Lightning Word Wizard introduces you to the "nuts and bolts" of Turbo Lightning technology, and gives you more than 20 different calls to the Lightning engine. If you're into programming, by studying the Turbo Pascal source code and the Lightning engine calls, you'll learn how to put word power into your own programs. You can use Lightning Word Wizard for the games, and/or as the technical reference manual and development toolbox for Turbo Lightning. Suggested retail: $69.95 (Bundled with Turbo Lightning, $149.95).

Recognition for Borland International has come from business, trade, and media, and includes both product awards and awards for technical excellence and marketing. Borland was named "Company of the Year" by PC Magazine; Sidekick, the #1 best seller for the IBM PC, was named "Product of the Year" by InfoWorld; Turbo Pascal was selected one of PC Week's Top 10 Products for 1984; SuperKey won one of PC Magazine's "Best of 1985" awards; Reflex, The Analyst was recognized in the "Software Products of the Year" awards by InfoWorld; and Reflex and SideKick were both nominated for British Micro Awards in 1986.



We frequently surprise people with inventive, imaginative software, and people frequently surprise us with the way *they* use it.

For example, you'll read on this page about how a California soaring club uses our Reflex: The Analyst™ to give their pilots weather and thermal predictions and charts and graphs every weekend.

That's an application we didn't imagine when we released Reflex as a highly visual analytical database manager and report writer.

But it's the kind of eye-opening application that might stimulate fresh ideas in your mind about how you can put your Reflex: The Analyst to work for you.

And thank you for your interest in and support for Borland International.

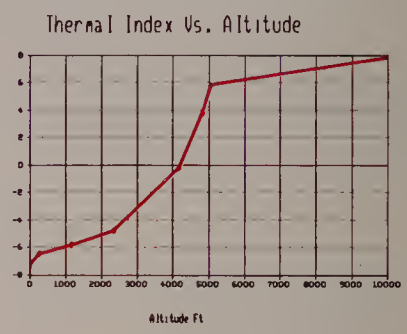
Philippe Kahn,
President, Borland International

Reflex: The Analyst and the Wild Blue Yonder!

Andrew J. Piziali wrote us, "I have been using Reflex for several months now for both home budgeting and, would you believe, SOARING FORECASTS!

This soaring forecast is uploaded to the local hang gliding bulletin board each Saturday and Sunday morning. Prior to using Reflex, the raw data was plotted on a weather chart with a plastic overlay. This (new) system is much easier to use and I can manipulate the graph scales and hypothesize soaring conditions under changing variables."

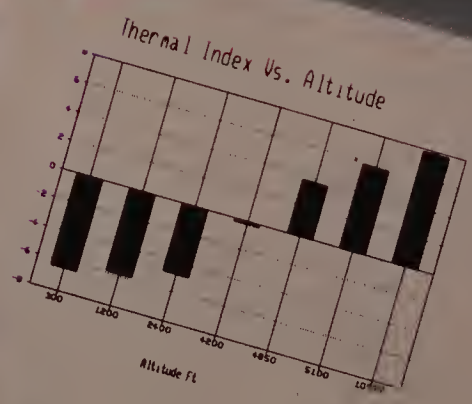
He sent us Reflex graphs showing "Thermal Index vs. Altitude" and "Temperature vs. Altitude" (both shown here), along with Reflex-generated reports showing inversions, wind direction, knot speeds at varying altitudes, and top of convection stats. All the

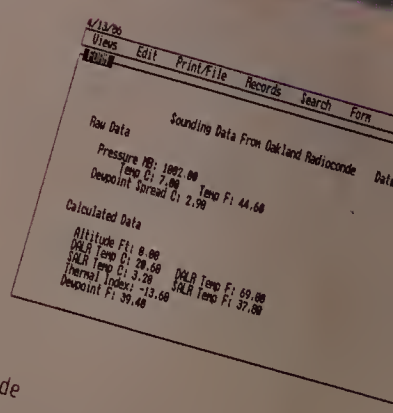


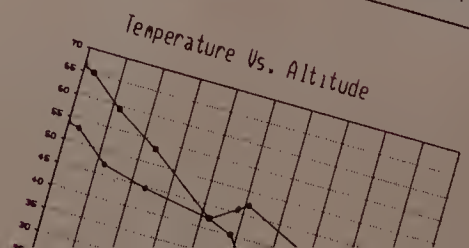
criteria pilots need to know and need to see before they fly, because most of them know the flying maxim, "There are old pilots and bold pilots, but there are no old bold pilots."

Another novel use for Reflex, the greatest analytical tool since the couch!

"The reason angels can fly is because they take themselves lightly." NAGITREV







INSIDE STORIES!

☐ Maybe no one but your mother knows you can't spell, but go on-line with CompuServe, MCI, The Source and others, and *the whole world knows*! So use Turbo Lightning to save you from public electronic embarrassment. Lightning checks your spelling on-line, as you type, and before the *werd* gets out. See inside pages for more.

☐ Just released, new addition to Turbo Lightning. Called the Lightning Word Wizard, it's both a technical reference manual for the "engine" that drives Turbo Lightning, and a crossword-solving, mind-bending, mystery-making, code-cracking set of word challenges—and you don't need to be a programmer to play.

LATE NEWS! TANDY NOW EVEN MORE HANDY!

☐ Borland International and Tandy Corporation have reached a new agreement which gives you about 5,500 more places worldwide to buy Borland products. Through Tandy's "Express Delivery" program, you can now order Borland products from any Tandy catalog in any Tandy store and get two-day delivery in the U.S.

TOSHIBA PICKS SIDEKICK AND SUPERKEY!

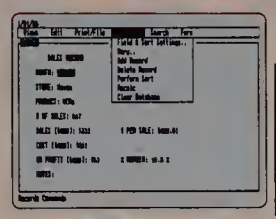
☐ Borland International and Toshiba America, Inc. have announced a joint marketing arrangement in which Toshiba will bundle Borland's SideKick and SuperKey programs on their new Toshiba 3100 portable, and SideKick on their new T1100 PLUS portable computers. The new Toshiba models and Borland's software programs are IBM PC-compatible.

Reflex: The Analyst upgrades and adds the new Reflex Workshop!

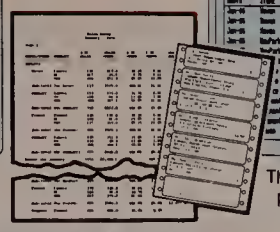
Why running your business without Borland's Reflex and the new Reflex Workshop is an act of blind faith

Running a successful business isn't something you can do with your eyes shut, but no matter what business you're in, Reflex™ and the new Reflex Workshop™ give you all the tools and views to see what all the numbers look like.

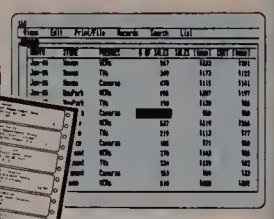
Reflex gives you five graphic ways of looking at your data, five different ways of analyzing your information.



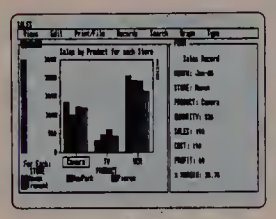
The **FORM VIEW** lets you build and examine your database.



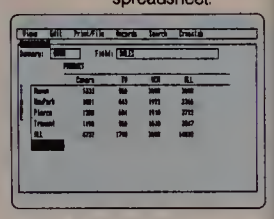
The **REPORT VIEW** allows you to generate everything from mailing labels to sophisticated reports. You can use database files created with Reflex or transferred from 1-2-3, dBASE, PFS: FILE, and other applications.



The **LIST VIEW** lets you put data in tabular list form just like a spreadsheet.



The **GRAPH VIEW** gives you instant interactive graphic representations.



The **CROSSTAB VIEW** gives you amazing "cross-referenced" pictures of the links and relationships hidden in your data.

Using Lotus 1-2-3® or dBASE® without Reflex is like driving at night without lights

Products such as 1-2-3 or dBASE can do the numbers for you, but you may still not get the picture—simply because they can't show you analytical graphs and pictures of your data, nor can they analyze and summarize all the information you manipulate like Reflex can.

The best just got better. Introducing Reflex 1.1 **NEW!**

The new Reflex 1.1 with expanded memory support allows you to manage huge databases of up to 8 megabytes of RAM, 32,000 records, and 250 fields per record with the now-legendary "Reflex Lightning Speed."

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Minimum memory: 384K

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If you already bought Reflex 1.0, get Reflex 1.1 and the Reflex Workshop for only $69.95

Because you bought Reflex from us, you're "our kind of people." And since we're not the "take-the-money-and-run" kind of company, you can upgrade to Reflex 1.1 and the Reflex Workshop for only $69.95. If you prefer to simply upgrade to Reflex 1.1, you can do that for only $10 by returning your 1.0 diskettes.

SPECIAL OFFER!

*You get Reflex 1.1 and the Reflex Workshop for only $199.95**

Sold separately, the new Reflex Workshop is $69.95 and Reflex is $149.95, totaling $219.90—but you can get them both for a limited time only, at an amazing $199.95. So act now, rush to your nearest dealer, call us, or clip the coupon and put Reflex 1.1 and the Reflex Workshop to work for you right away!

NEW! Introducing the Reflex Workshop

Only $69.95

A major addition to Reflex, the new Reflex Workshop gives you a wide range of analytical tools written for specific applications. You can use these tools "as is" or modify them to suit your business needs. What you have to work with right away are 22 different tools:

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- *Asset Inventory Tracking*
- *Cash Management Trial Balance*
- *Commercial Real Estate Tracking & Analysis*

For Administration:
- *Mail List*
- *Appointment Scheduling*
- *Applicant Tracking & Inquiry System*
- *Facilities Planning*
- *Project Scheduling*

For Sales & Marketing:
- *Sales Lead Tracking & Analysis*
- *Store Check Inventory Analysis*
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For Production and Operations:
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__	Reflex Workshop	69.95*	$ ____
__	Reflex, Reflex Workshop	199.95*	$ ____
__	Turbo Prolog	99.95	$ ____
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__	Turbo Graphix Toolbox	69.95	$ ____
__	Turbo Tutor 2.0	39.95	$ ____
__	Turbo Editor Toolbox	69.95	$ ____
__	Turbo GameWorks	69.95	$ ____
__	Turbo Lightning	99.95	$ ____
__	Lightning Word Wizard	69.95	$ ____
__	Turbo Lightning, Lightning Word Wizard	149.95	$ ____
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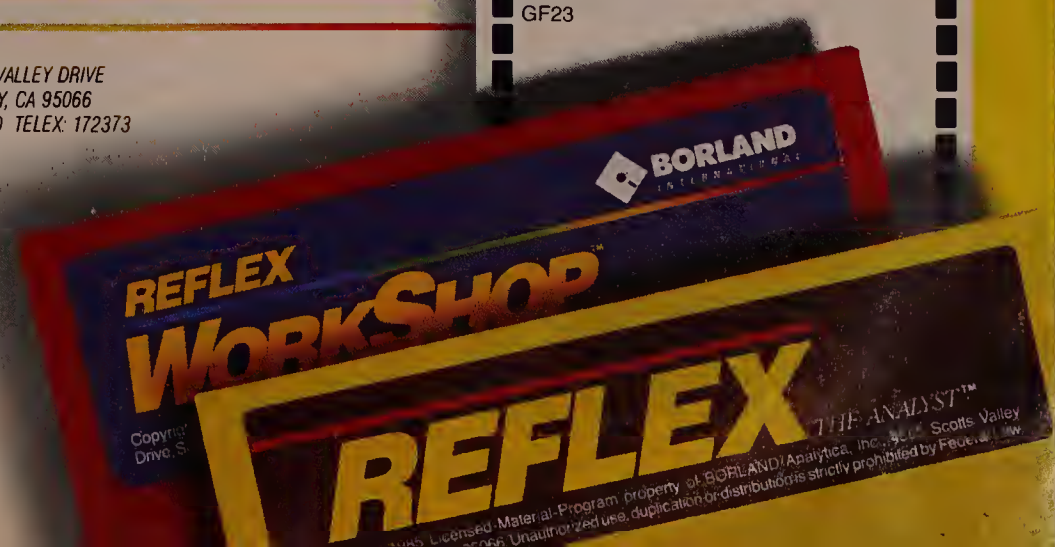

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PC WORLD

The Comprehensive Guide to IBM Personal Computers and Compatibles
August 1986

172 **Are Corporate PCs Earning Their Keep?**

For years the growth of PCs in America's corporations has been unfettered. Many companies are now trying to measure the results and are working in earnest to translate great expectations into dollars and sense.

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IBM's PC Convertible has the low price, totable weight, and long battery life to make the cut as a laptop for the road, and it comes with enough options to carve out a niche as a low-cost desktop. Only a lackluster screen stands in the way of success.

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A Hard Drive The Easy Way.

Turn your PC into an XT in seconds with OnBoard, Maynard's new hard drive card!

So your PC needs a hard drive...

When you bought your PC, you never dreamed you'd need more than floppy drive performance. But now, both you and your PC are ready for more. In fact, there's just one reason you've been putting off getting a hard drive. Admit it. It's the installation. Cables and controller and all that.

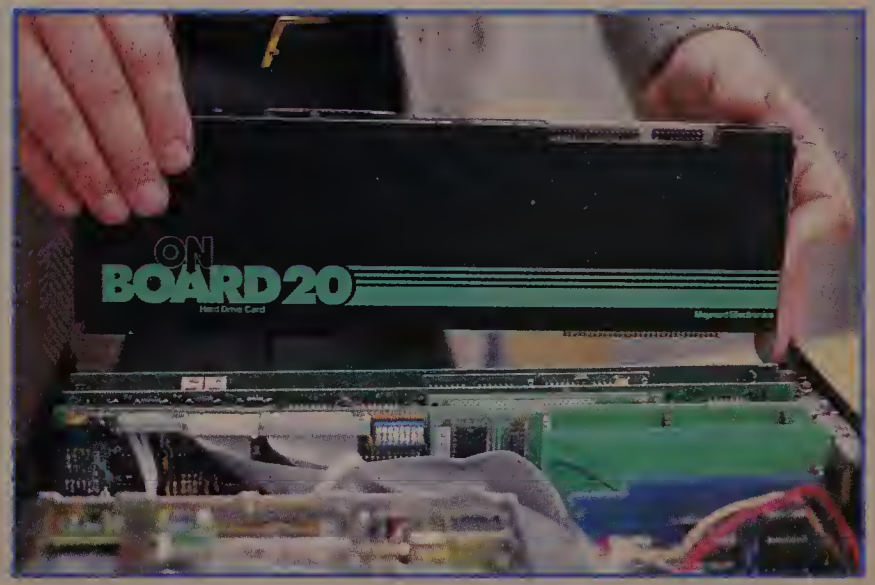
Well, relax. OnBoard is here. The hard drive card that boosts your PC's storage capacity to rival any XT or AT* on the block! OnBoard snaps easily into one of your IBM PC's expansion slots! Open your PC, plug in OnBoard, and close your PC. Just like that. Your PC will boot directly to OnBoard when you power up — no more floppy disk maneuvering.

Powerful Self-Control.

If you already have a hard drive in your PC, OnBoard's controller card will double up and run both hard drives. Which helps keep your expansion slots open for other business.

Lots of Head Room, Lots of Desk Room.

OnBoard puts up to 20MB of power into your PC, turning it into a hard drive heavyweight in seconds! If you need less storage but the same speed and fine performance, you can install OnBoard 10.



Single-Slot Installation.

Simply snap OnBoard into expansion slot 1 of your IBM PC* or XT, leaving all your other slots free for additional boards.

OnBoard is designed to work in today's leading PCs and is available at the finest computer stores. Contact your local dealer or call us today for more information.

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- RUGGED—Right down to our exclusive shock isolation steel base, every Sidesaddle is built to withstand years of use. Full bearing steel slides support the computer, keyboard, and printer shelves. And, a special combination of high density laminates, real wood tambour doors and moldings result in a cabinet that is rock solid and simply beautiful. We back it with a full 10-year warranty.
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- SECURE—The door on the Sidesaddle locks to protect your computer and software. Even the optional monitor cover has its own lock.
- MOBILE—Check out the large twin wheel heavy duty casters, standard.
- OPTIONS—So complete we can only offer two options: a locking monitor cover and a vertical diskette organizer for your favorite software.
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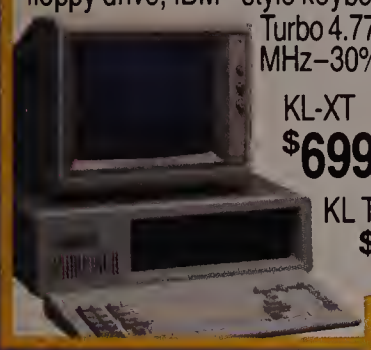

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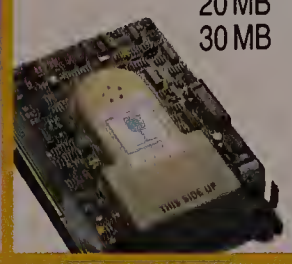

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Circle 683 on reader service card

The Write Stuff

AST's TurboLaser has it all. The best combination of high-speed, sharp graphics, typeset-quality text and unlimited software compatibility on the market. Printed in a moment's notice, newsletters, charts, letters, drawings, reports, forms, manuals and more, never looked more professional. Judge for yourself—feature-for-feature AST's desktop laser printer writes off the competition.

AST TurboLaser™: full-page 300 dpi HPGL™ graphics so fast it leaves LaserJets™ on the runway.

TurboLaser Versus LaserJet Desktop Laser Printer Comparison

Feature	AST TurboLaser	HP LaserJet	HP LaserJet PLUS	HP LaserJet 500 PLUS
Original Pages per Minute Speed (text and graphics)	**8**	«8	«8	«8
Full Page 300 dpi Graphics	**Yes**	No	No	No
HPGL Graphics Compatibility	**Yes**	No	No	No
1.5 MB RAM	**Yes**	No	No	No
Built-In Rasterizer (RIP)	**Yes**	No	No	No
Wide Variety of Standard Fonts, Styles and Sizes (resident and instantly accessible)	**Yes**	No	No	No
Wide Range of International Fonts	**Yes**	?	?	?
Built-in Page Description Package	**Yes**	No	No	No
Standard Serial *and* Parallel Interface Support	**Yes**	No	No	Yes
Input Tray Capacity (pages)	**250**	100	100	500
Output Tray Capacity (pages)	**250**	20	20	500
Collated Face-Down Output	**Yes**	No	No	Yes
Diablo 630 Emulation	**Yes**	Yes	Yes	Yes
Epson Emulation	**Yes**	Yes	Yes	Yes
Monthly Duty Rating (pages)	**5K-10K**	2-3K	2-3K	2-3K
Life Expectancy (pages)	**600K**	100K	100K	100K
Fully Compatible With All AST Products:	**Yes**	?	?	?

Eight "ORIGINAL-Pages-Per-Minute" Speed. AST prints originals at the rate most laser printers can only produce additional copies. Other desktop models boast eight-pages-per-minute, but are referring to the time it takes to make copies of an original. Printing eight-ORIGINAL-pages-per-minute, TurboLaser obsoletes the "pages-per-minute" standard.

Full-Page, High-Resolution Graphics. Complete 8½" x 11"-page graphics with 300 dpi (dots per inch) resolution makes TurboLaser an ideal business graphics and CAD/CAM presentation tool. The competition is confined to small "token" graphics output.

Wide Range of Emulation Capabilities and Software Compatibility. TurboLaser provides a complete emulation of HPGL, the plotter language used by over 90 percent of all business graphics and CAD/CAM software. Likewise, TurboLaser fully emulates Lasergraphics Language™ (LL) and popular printers, such as Epson,® Diablo 630® and the extended 630 (X-630™). As a result, you can print virtually all PC-based application software, including Lotus,® Symphony,® Framework,® WordStar,® dBASE,® Chart,™ Word,™ etc., and CAD/CAM graphics such as AutoCAD,™ CADVANCE,™ VersaCAD™ and many others.

Multiple Fonts, Styles and Sizes. Perfect for desktop publishing, TurboLaser provides a wide variety of fonts, type styles and point sizes for versatile and creative communications.

Sophisticated Paper Handling. Run large print jobs unattended with TurboLaser's large input and output trays. And face-down output reduces collating time, so you can produce reports on the run.

Full Compatibility With AST Products. Best of all, there's never a question of compatibility with AST's present and future products, including data communications, local area networks and micro-to-mainframe solutions.

For great impressions in record time, get the write stuff—AST TurboLaser. For more information, call our Product Information Center **(714) 863-1480.** Or send the coupon to:

AST Research, Inc.,
Subsystems Group,
2121 Alton Avenue,
Irvine, California
92714-4992.

A Few of the Standard Fonts:

LETGOTH	ABCDEFGHIJKLMNOPabcdefghijklmnop123
LETGOTH	*ABCDEFGHIJKLMNOPabcdefghijklmnop123*
LETGOTH	**ABCDEFGHIJKLMNOPabcdefghijklmnop123**
COURIER	ABCDEFGHIJKLMabcdefghijklm123
COURIER	*ABCDEFGHIJKLMabcdefghijklm123*
COURIER	**ABCDEFGHIJKLMabcdefghijklm123**
DUTCH	ABCDEFGHIJKLMNOPabcdefghijklmnop123
DUTCH	*ABCDEFGHIJKLMNOPabcdefghijklmnop123*
DUTCH	**ABCDEFGHIJKLMNOPabcdefghijklmnop123**
SWISS	ABCDEFGHIJKLMNOPabcdefghijklmnop123
SWISS	*ABCDEFGHIJKLMNOPabcdefghijklmnop123*
SWISS	**ABCDEFGHIJKLMNOPabcdefghijklmnop123**

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C&C Computers and Communications

Your first color monitor should be good enough to be your last.

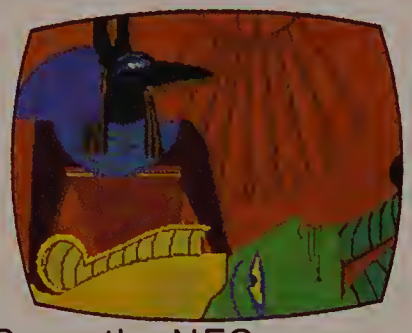
NEC introduces the only color monitor you need. Superb resolution plus MultiSync for across-the-board compatibility with all three PC graphics boards made by IBM,® for business graphics, CAD/CAM, computer art, and text.

Now there's one high resolution color monitor that does things your way. The MultiSync™ monitor from NEC.

It gives you the best color resolution available at the price.

- Compatibility with the IBM Professional Graphics Adapter, the IBM Enhanced Graphics Adapter, and the IBM Color Graphics Adapter.

Compatibility with the IBM® Enhanced Graphics Adapter Board



- MultiSync, the NEC feature that automatically adjusts to color adapter board scanning frequencies from 15.75 KHz to 35 KHz—suggesting the possibility that the MultiSync monitor might be compatible with *all* color graphics boards that are fully compatible with the IBM PC, PC/XT, and PC/AT, now and in the future.
- Full implementation of high resolution graphics software for business and other applications, now and in the future.
- And color capability limited only by the board being used.

See Things Our Way

Until now, you had to choose different color monitors for compatibility with all three PC color graphics boards made by IBM. With so many board and monitor configurations, folks didn't know which way to look.

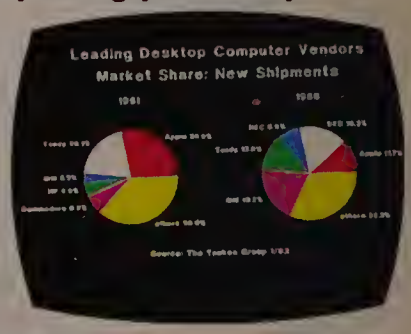
The new MultiSync color monitor gives you unique compatibility. As well as TTL and analog color. With 7 switchable text colors. And resolution up to maximum 800 horizontal dots and maximum 560 vertical lines, on a large, 13″ diagonal viewing area.

All that, priced at just $799. All from NEC, a name respected around the world for advanced, reliable products backed by nationwide service.

Compatibility with the IBM® Professional Graphics Adapter Board

It's the one color monitor that does everything your way.

Compatibility with the IBM® Color Graphics Adapter Board



But why talk more about it? Visit your nearest dealer and see a graphic demonstration of the new NEC MultiSync monitor's capabilities. Then draw your own conclusions.

For information dial

1-800-447-4700

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Personal Computer Division
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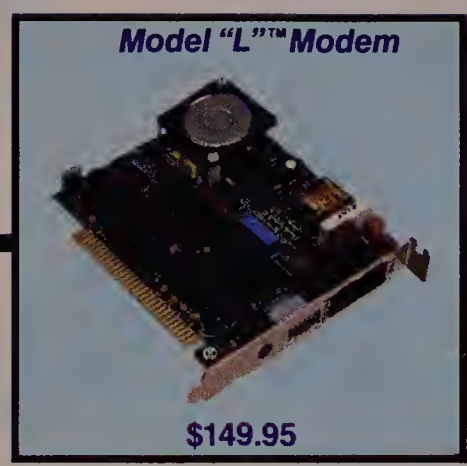

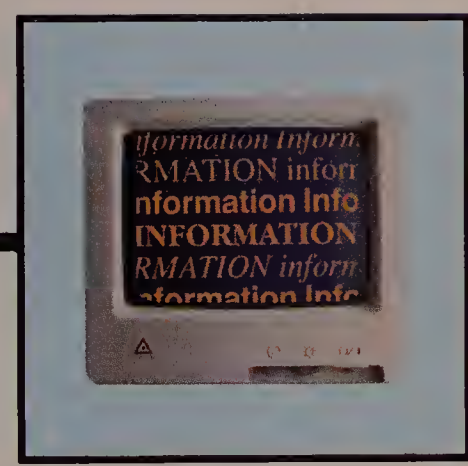

The Leading Edge Model "D" comes complete with more standard features than most others list as options. It's IBM®-compatible, it comes with a 15-month warranty and when configured with a single drive is priced at $1345.00. A dual disk-drive version and a 30MB Fixed-drive version of the Model "D" are also available.

The Leading Edge Model "L" Series 1200B Modem fits in full or half-size slots of the Leading Edge Model "D"™, "M"™, and "MH"™, the IBM PC, AT, and IBM compatibles. It's Hayes®-compatible, yet at $149.95 is priced at about a third the price of Hayes' equivalent.

Electronic data bases like the Source℠, CompuServe℠, and 2,500 others, give you instant access to information on just about every topic under the sun. (Access charges vary.)

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The personal computer that continues to raise high performance to new heights.

If you work with high volumes of information, you need answers fast.

Which is why IBM created the Personal Computer AT.® The PC designed to push high performance even higher.

The power of Advanced Technology.

Turn on the power, and you'll notice the advances right away.

To begin with, the Personal Computer AT can compute with astonishing speed. That's something you'll appreciate every time you recalculate a spreadsheet. Or search through a data base.

It can store mountains of information—up to 15,000 pages' worth—with a 30-megabyte "hard file" (fixed disk). And when business gets bigger, you can double your capacity to 60MB with a *second* hard file.

Advanced Technology advances again.

Fast as it is, new models of the Personal Computer AT run up to 33% faster.

Plus, you can now select an enhanced keyboard. It has separate cursor keys, a separate numeric keypad (for easier data entry) and twelve function keys. It also has a main typing section patterned after the classic IBM Selectric® keyboard, which makes word processing easier than ever.

In addition, you can also choose a new option that lets you use 3.5-inch diskettes with your Personal Computer AT.

Family ties.

The Personal Computer AT is compatible with the IBM PC and PC/XT. So it can run many of the thousands of programs written for the IBM PC family.

And with new IBM products, the Personal Computer AT can more easily communicate with other PCs.

IBM's networking options, for example, let you share files from a variety of popular programs.

While the IBM PC 3270 Emulation programs let you retrieve information from a mainframe.

You can also use the Personal Computer AT to run IBM PC XENIX® —an enhanced multi-user, multi-tasking operating system.

A powerful value.

Only the Personal computer AT offers these capabilities *and* IBM's commitment to quality, service and support. A combination that can't be cloned.

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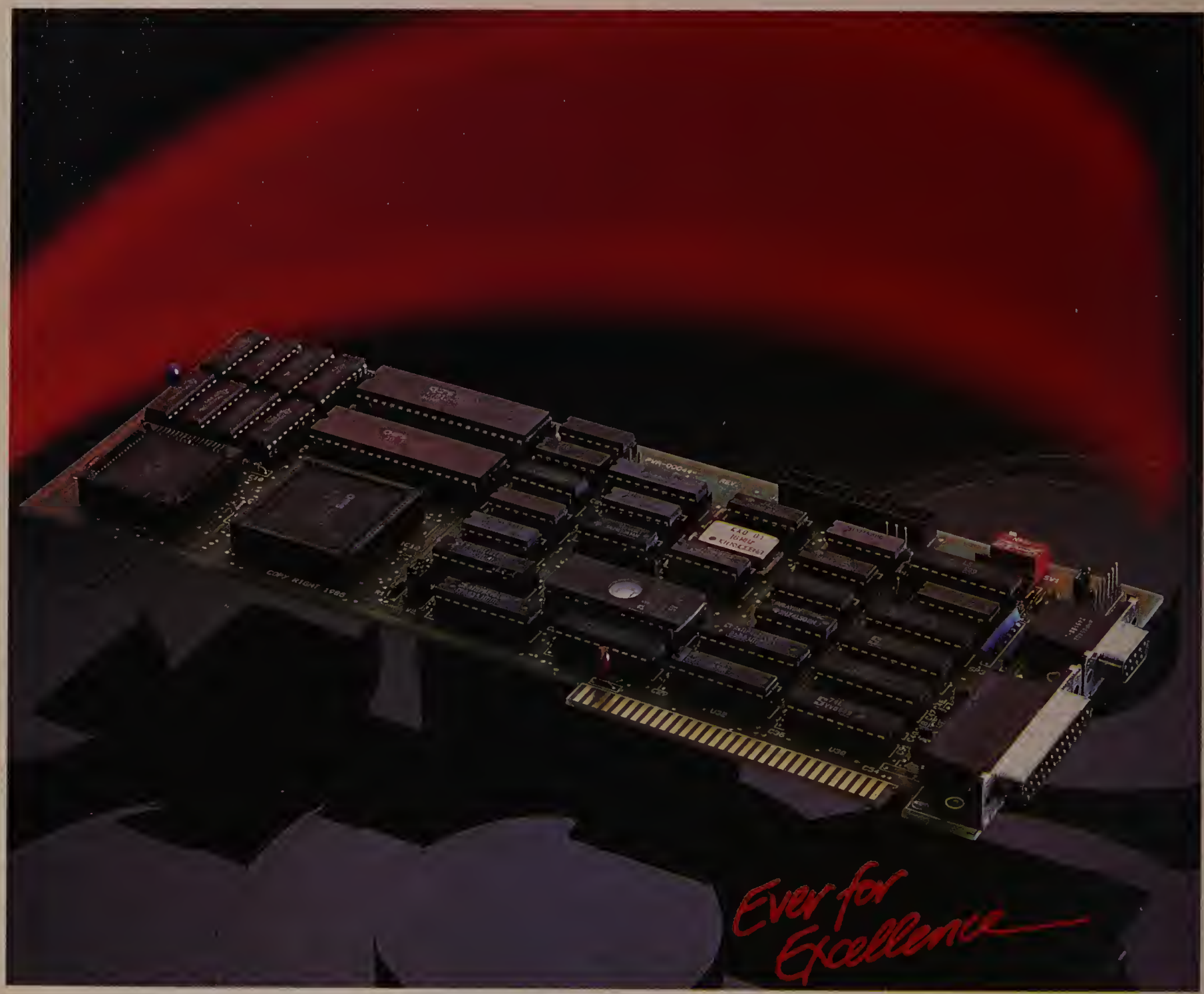

Enhancer™... EGA card, $399

The EVEREX Enhancer is the IBM compatible EGA card that delivers value with price, performance, and features!

No Options Needed.

With other EGA cards you have to pay extra for options like 256K screen memory and a parallel printer port. With the Enhancer these features are standard and there are no extras to buy.

11 Display Modes

There's 16 colors from a palette of 64 in 640x350 resolution. Text is displayed in readable 8x14 character format in text mode. And the Enhancer's monochrome mode can support monochrome graphics on a monochrome monitor. In addition to 6 EGA modes and a monochrome mode, there's 4 color modes.

Software Switched

The Enhancer comes with EGMODE menu-driven software that lets you change display modes, even monitors, without opening your chassis, with the push of a button. Useful help windows take all the mystery out of each possible display mode.

The Perfect Adapter

For enhanced color graphics, monochrome text, and standard color text and graphics, the EVEREX Enhancer is the perfect adapter to pair up with your software library. Call your local dealer for a demo, or call EVEREX to get all the facts on our new line of video adapters.

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Circle 699 on reader service card

David Bunnell

The Making of a Precedent

Digging for the roots of the personal computer is more than unearthing the not-so-distant past. The further you dig, the better you're able to see the shape of future possibilities.

Do you remember that famous scene at the end of the science fiction film *Planet of the Apes* where Charlton Heston discovers the Statue of Liberty buried to the head on a beach in the distant future?

We in the personal computer industry have our own little statues of liberty, totems of technology, that have been lying abandoned in garages and workshops across the country. Their creators, like the inspired French democrats who built the Great Lady of New York Harbor, shared a vision of a new kind of freedom for humanity.

I'm referring to the earliest models of the personal computer, which were built "aeons ago," back in the early seventies. Today, most of them have almost been forgotten.

Recently, I had the opportunity to participate in a historic event that gave me a great feeling of hope for the future of PCs. I was asked to be one of the judges for the Early Model Personal Computer Contest at the Computer Museum in Boston. The purpose of the contest was to help the museum trace the history of PCs before some of those vintage models vanished entirely from the face of the earth.

People were invited to send in early-model personal computers. Some 320 entries from 13 countries were submitted, and 190 were chosen to remain in the museum's permanent collection.

My fellow judges were Apple Computer cofounder Steve Wozniak and Oliver Strimpel, the museum's eminently micro-knowledgeable British curator. Our archeological mission was to uncover the five most historically important micros from the ruins of early PC civilization.

And the winner is . . . the Kenbak-1 PC with 256 bytes, built circa 1971!

The four runners-up were the Micral, a commercial PC built in France in 1973; the TVT-1 prototype, the first PC able to display text on a screen; the VDM-1, a

(continues)

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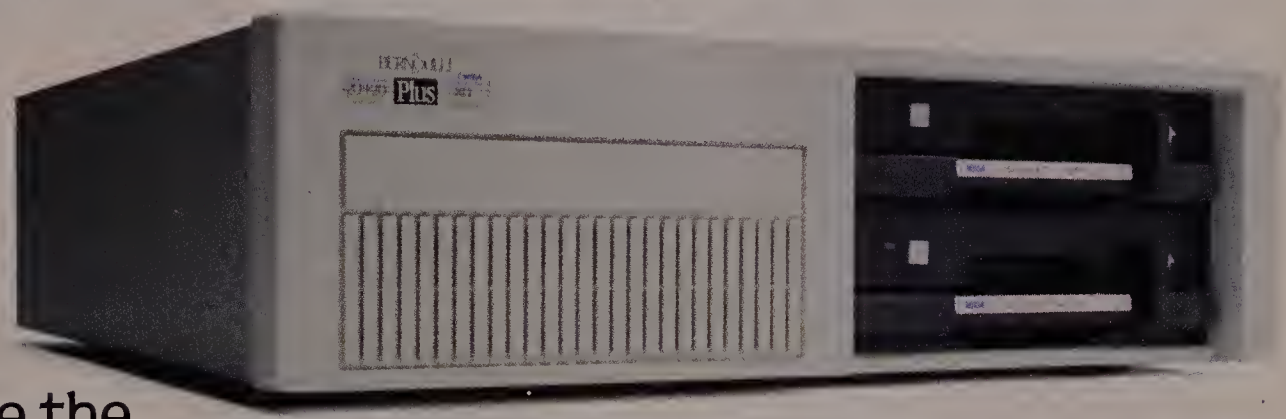

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David Bunnell, Steve Wozniak, and Computer Museum curator Oliver Strimpel (left to right) pose with the first commercially available personal computer, the Kenbak-1.

memory-mapped video display generator for S-100-based systems; and my own sentimental favorite (because I worked at MITS in the early seventies), the MITS Altair 8800.

The origins of the contest go back in the mists of time to when Bill Millard, founder of ComputerLand, and Pat McGovern, chairman of IDG, the computer publishing empire with over 70 publications worldwide, visited the Computer Museum together.

Millard noted that the museum had a fine collection of early mainframe computers and minis but thought it was a shame that early personal computers weren't better represented. Millard thought he and McGovern should do something about it.

He said he would be willing to put up the money to acquire the early PCs if McGovern would handle the publicity. McGovern readily agreed. Along with Gwen Bell, president of the Computer Museum, and Oliver Strimpel, they created the concept for the contest.

The public response was phenomenal, and the PC entries poured in.

So one spring afternoon, the Woz, Oliver, and I spent about four hours rummaging in a windowless storage room behind the museum. It was filled with eerie-looking metal cases containing the "prehistoric" micros. We looked closely at each one and considered such factors as how interesting it was, how significant, how early, what impact it had had on the industry, and what condition it was in.

Most of the computers had been made from kits. Others were simply homemade; people had breadboarded their own circuit boards. In fact, some of the PCs had been assembled before there were integrated circuits. I saw one of the earliest computers ever built into a briefcase.

Some people sent in complete systems. For example, there was a Southwest Technical Productions machine, an early 8-bit microcomputer system that had been constructed from a kit. It featured a printer, a keyboard, dual tape drives, and a monitor. It also had a vast selection of software.

(continues)

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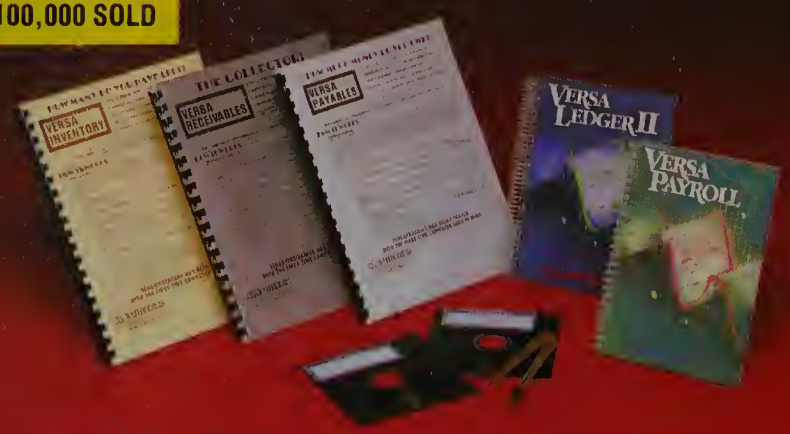

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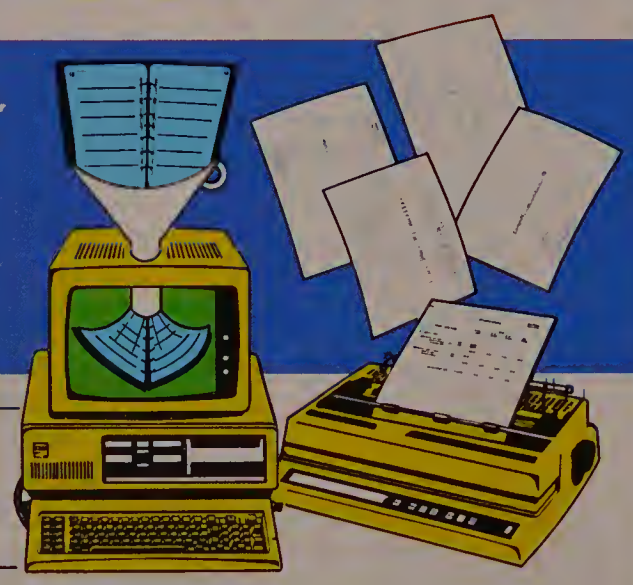

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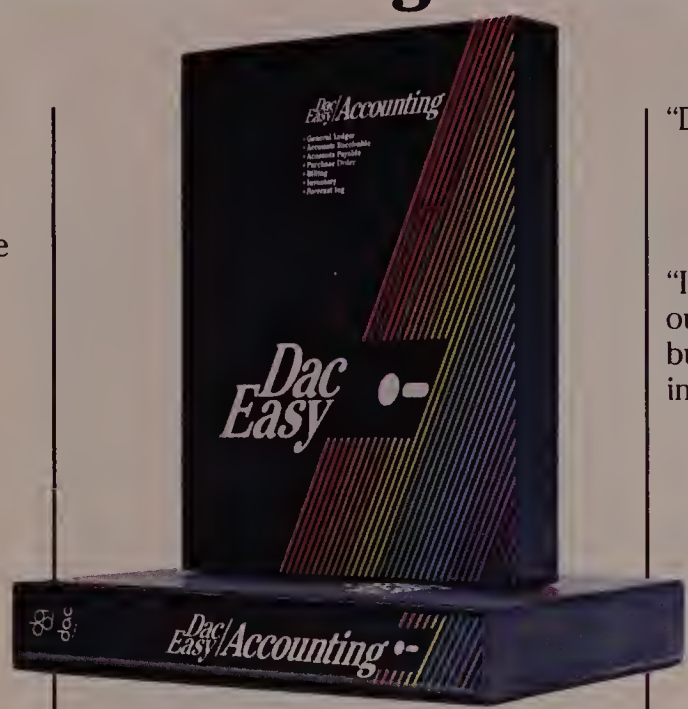

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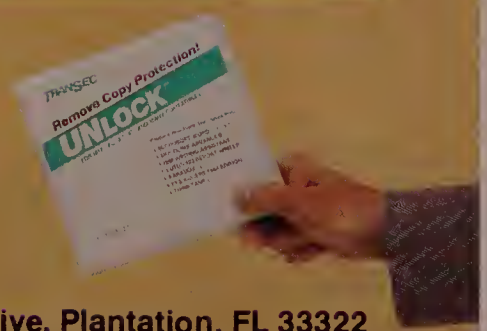

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Woz, Oliver, and I toiled long and hard before we pronounced the Kenbak-1 the winner. This computer had lights and switches on the front and could be programmed to make the lights blink in patterns. It was built in 1971, before microprocessors, and was aimed at the educational market. The Kenbak-1 was advertised in *Scientific American,* but only 40 were sold, at $750 each.

It's interesting to note that the machine's inventor, John Blankenbaker, went on to become one of the founders of Symbolics, a company that builds workstations for artificial intelligence applications.

Among the four runners-up was Don Lancaster's 1974 TVT-1 prototype, known as the "TV Typewriter." You built your own terminal, which resembled a keyboard. Then you hooked it up to your TV so you could write on the screen. You could actually change the letters on screen. It didn't have a printer, but it was the first low-cost word processing application. A lot of hobbyists and experimenters were excited about that.

Another winner, Lee Felsenstein's VDM-1 video display terminal, was the first real computer terminal built to interface with a TV. With it, you had the intelligence of a computer plus the ability to connect to a printer, store programs, and so forth. Felsenstein's machine was actually a 1974 prototype of the VDM-1 built into an old Singer computer terminal case. It was remarkable.

(continues)

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Missing some names? Remember, you're in the Microsoft Windows operating environment. Two more clicks and your list of corporate directors, stored in another file, appears in the corner of your screen. Now you can edit your presentation and refer to the list simultaneously.

That takes care of the text chart.

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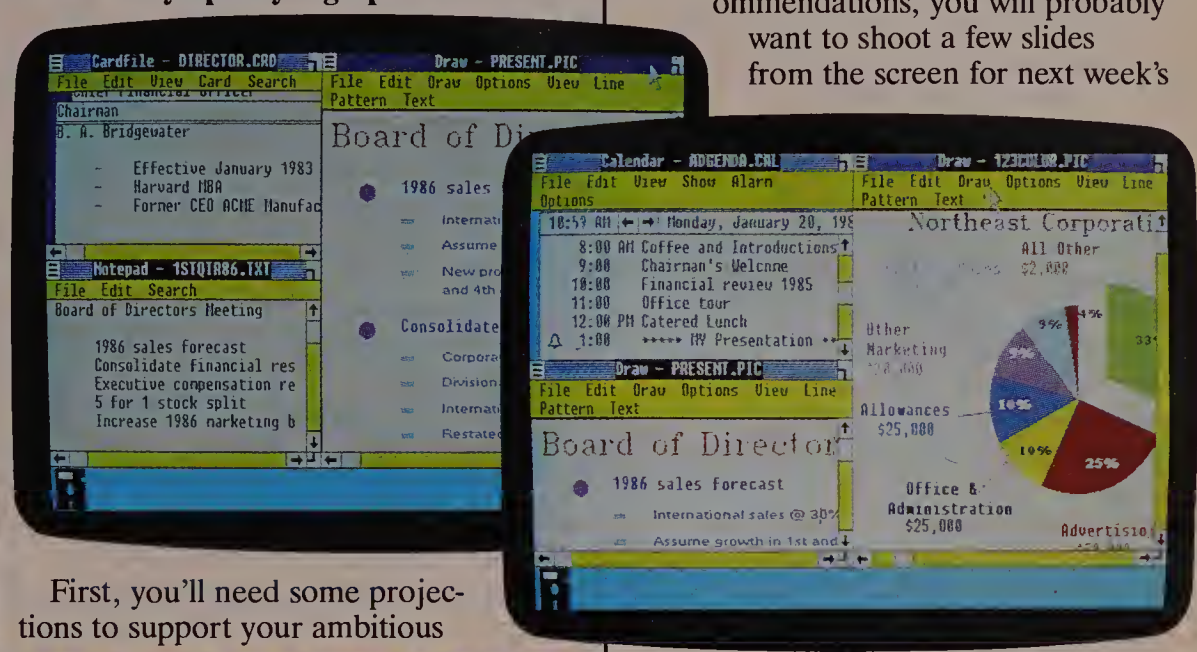
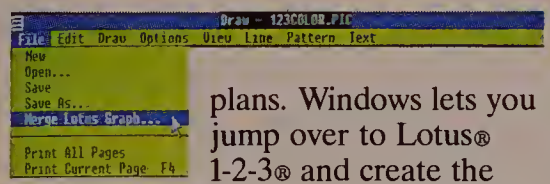
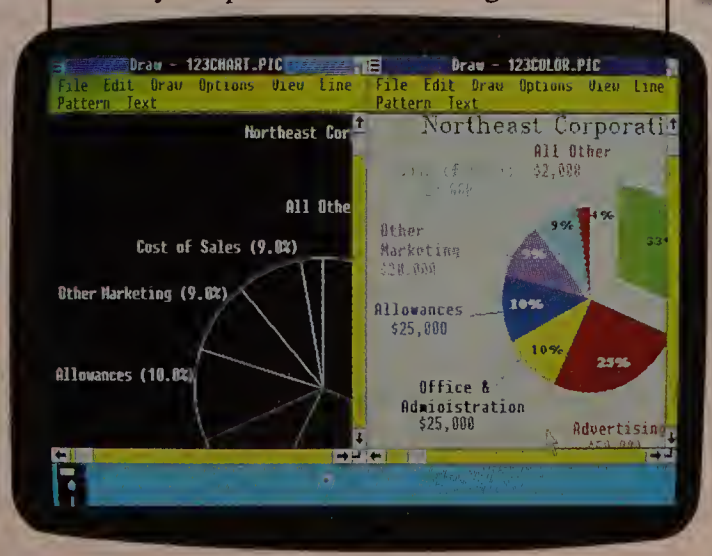


First, you'll need some projections to support your ambitious plans. Windows lets you jump over to Lotus® 1-2-3® and create the charts you'll need. With *"DRAW!"* you pull them right from the Lotus file and place them squarely in your presentation.



Now it's time to dress them up a little. You use *"DRAW!"'s* object-oriented editing to make them really jump off the page. Scale the chart to fit your presentation. Change some text fonts, styles and sizes here, add a few colors there, and it's done.



Now that's a convincing presentation. In fact, after the board accepts your recommendations, you will probably want to shoot a few slides from the screen for next week's presentation to the investors.

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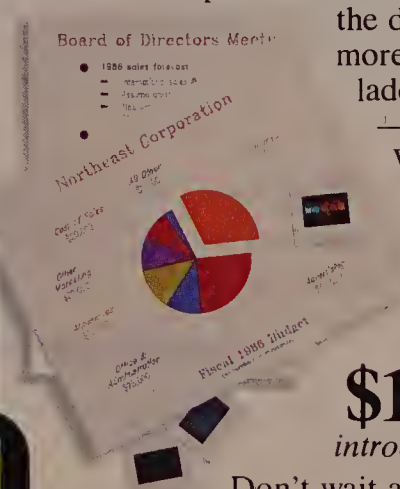

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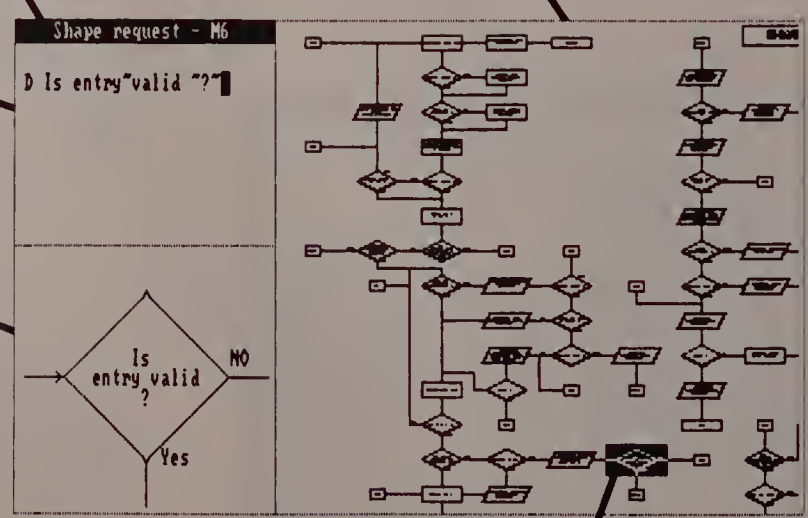
The sample screen display shown below is typical of what you see while editing a chart. Other screen displays are provided for entering titles, changing options, getting "help" and so on.

STATUS BAR (not to be confused with a wet bar) tells you what Interactive EasyFlow is doing at all times.

CHART WINDOW gives an overview of your chart; this example shows the "normal" view. "Close-up" view shows a smaller part of the chart in more detail. "Wide-angle" view shows a larger part of the chart at reduced size.

TEXT/MESSAGE WINDOW used to enter user text and to display messages from Interactive EasyFlow.

CURRENT SHAPE WINDOW - shows the content of the current flowchart shape (the one under the SHAPE CURSOR) in complete detail.



SHAPE CURSOR shows where you are in the chart. Cursor keys move it around; chart window scrolls if you run off the edge of the window.

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Circle 489 on reader service card

Then there was the MITS Altair 8800. Because I started out in personal computing at MITS, when I saw the museum's Altair, I felt like I was peering into a time capsule that held an important part of my life.

The model that was entered in the contest featured an array of added circuit boards from companies like Processor Technology, Cromemco, Polymorphic, and Vector Graphics. It showed what a powerful system the Altair could be pushed into becoming.

During the contest judging, I found Wozniak to be a true, almost pure, engineer. He's inquisitive about the real, technical problems that face computer designers. At the same time, he's intrigued by electronic devices that control stereos, lights, and home appliances.

Woz also has a wonderful, almost childlike mind. He enjoys playing pranks and telling jokes, and his creative approach is tremendously refreshing.

I remembered that in the early days of personal computing, people like Steve Wozniak freely exchanged ideas with others. The Apple II was even "designed" at a series of Home Brew Computer Club meetings. Woz and Steve Jobs would demonstrate the latest developments on the Apple II just to discuss with club members how the project was progressing.

So essentially, the Apple II was developed publicly. That spirit of sharing, that need to share technology, and the importance of

(continues)

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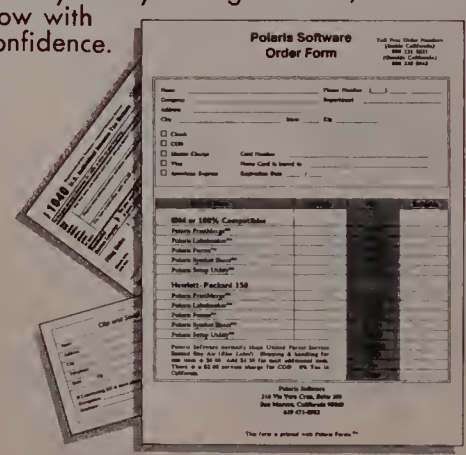

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sharing information overrode the more commercial aspects of the business.

That same spirit was unmistakably reflected in all the products submitted to the museum.

That sense of innovation and freedom and creativity seems to be missing from today's highly structured business environments. Now that the corporate society has taken over PCs and their development, it would appear that innovation has been strategically stifled.

I hope that the early pioneers like Wozniak, Steve Jobs, and Altair creator Ed Roberts have success in our modern PC environment, because we really need them. We need their spark and daring, the personality they put into the products, and their audacity in trying things others would never dream of trying. It's a spirit that borders on naïveté.

You can sense that spirit of high-tech and high jinks when you visit the Computer Museum. It's what really makes the early PC exhibit a memorial, not just to the technology of the machine, but also to the good humor and the good times that went into creating the personal computer.

I hope the museum serves as a reminder for us not to stray too far from our original vision. Otherwise, future historians of the PC might remember our civilization as the Planet of the Eight Bits, whose system crashed from an overload of arrogance.

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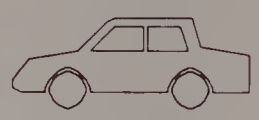

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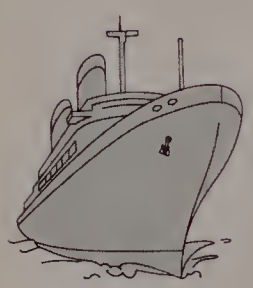

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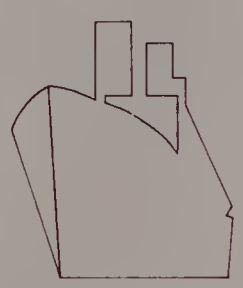

Competitor B

In addition to the 2,200 symbols included with Diagraph, 3,000 optional symbols and company logos are also available.

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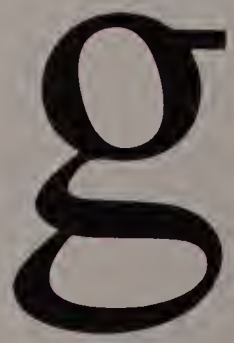

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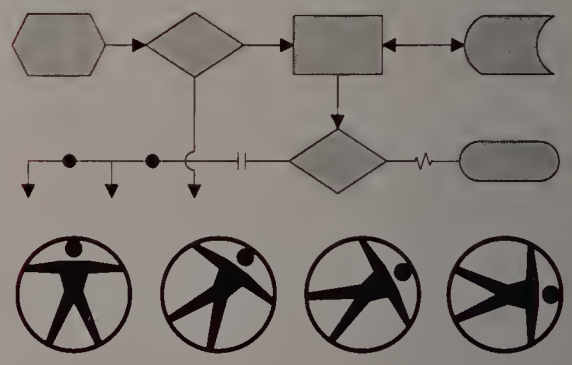

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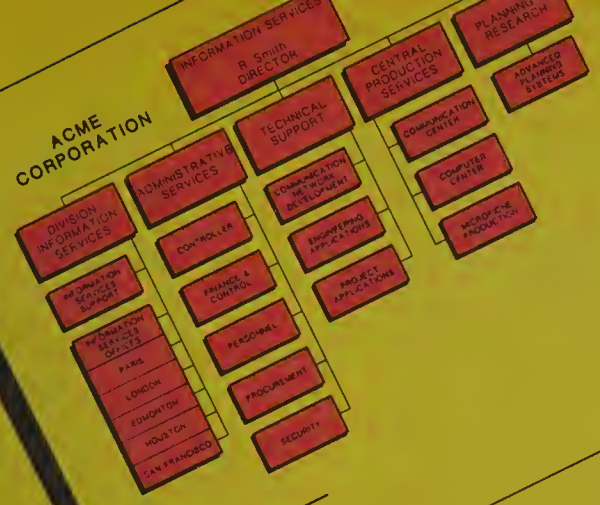

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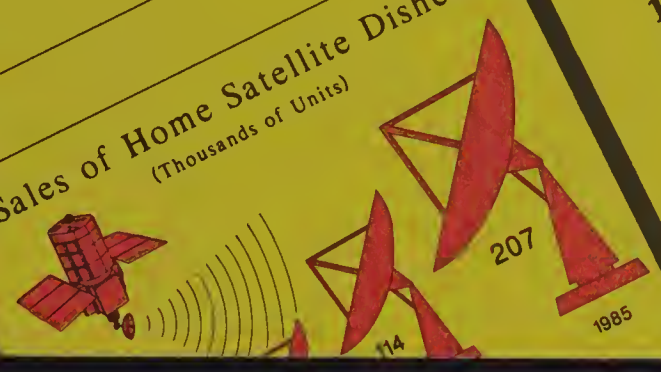

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Letters

Reactions and responses from the PC World community

The Battered PC Dealer

As a retail computer dealer, I think "The Battered PC User" [David Bunnell's column, *PCW*, April 1986] should have placed part of the responsibility for support problems on the users themselves. Support problems aren't always the fault of profit-conscious dealers. Part of the blame belongs to impulsive consumers who buy systems and software before knowing what they actually need. *Symphony* may be fantastic, but it's overkill for an individual who'd do better with a simpler program like *pfs:plan*.

Consumers also tend to look for low prices without considering the amount of dealer support that's available. If an ad touts a machine for a fraction of the retail price, they should ask themselves why.

I suggest that consumers assume more responsibility for their purchasing decisions. As in all other phases of life, don't believe everything you read. If a manufacturer or dealer won't demonstrate an application program on the system that you use, don't buy it! When a product is totally misrepresented, complain to the dealer. If satisfaction isn't forthcoming, go to a local consumer advocacy group. Finally, and most importantly, support dealers that support you, even if it costs a little extra. After all, how much is it worth if you can avoid spending 4 hours on a problem that could have been solved in 5 minutes?

Martin Cherry
President
Computers Limited
Jericho, New York

Late to the Gate

Hey *PC World!* The Great Compatibles Derby was won on February 28, 1986. The Z-200 enabled Zenith Data Systems to capture the largest personal computer contract ever awarded by the U.S. Government. According to your AT-compatibles roundup [*From the Hardware Shelf, PCW*, March 1986], the winner wasn't even in the running.

Robert H. Kalk
Gaithersburg, Maryland

The Z-200, alas, was not released in time for the AT-compatibles roundup. However, without passing judgment on the Zenith machine, readers would do well to remember that the U.S. Government also buys coffeepots for $700 a crack. —Robert Luhn

It Pays to Advertise

While advertisements are a source of annoyance on television and radio, they're an indispensable source of information in a technical journal like *PC World*. I must therefore disagree with Greg Weismantel's criticism [*Letters, PCW*, March 1986] that the space devoted to advertising detracts from editorial content.

Advertising, at the very least, is the free enterprise system at work. Competition helps technology to progress while keeping prices low. I wouldn't want it any other way. I have no quarrel with your fine magazine, and I shall continue to purchase it every month for two reasons: editorial content and advertising.

Dennis Quinn
Oak Park, Michigan

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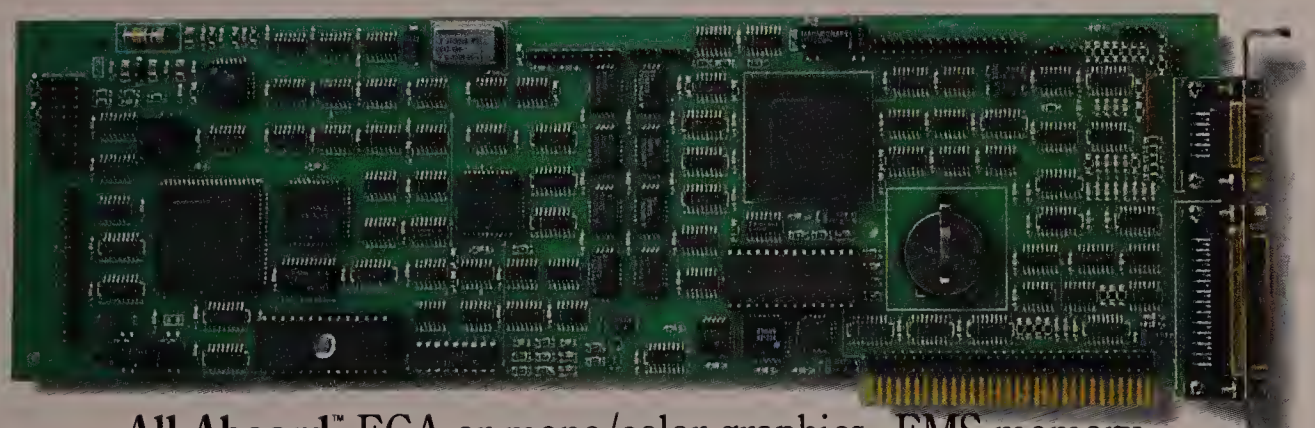

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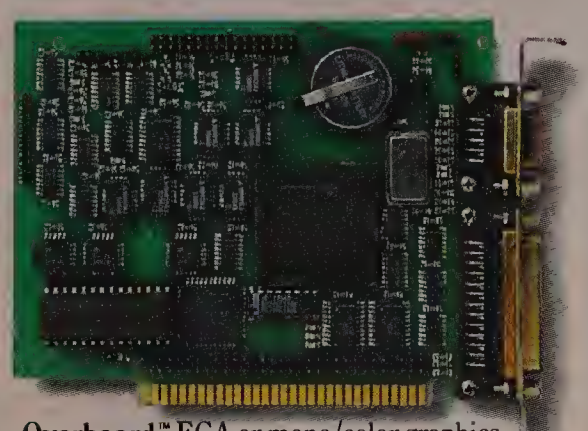

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Suspect Is Suspect

I know *PC World* is for "serious" business users, but that's no reason to shortchange game enthusiasts. The review of Infocom's *Suspect* [*From the Software Shelf, PCW,* May 1986] was written by someone who admittedly doesn't play that kind of game. Just as you wouldn't let a novice review *dBASE III Plus,* you can't expect a beginner to understand the intricacies of an advanced-level game like *Suspect.*

The author's greatest difficulties arise from a misunderstanding of murder mysteries in general and not from the "idiosyncratic workings" of *Suspect.* She makes wild accusations about other characters, then doesn't understand why neither they nor the police will respond. Would Hercule Poirot listen to his number one suspect blame someone else without proof? She must establish her own innocence by showing the police concrete evidence.

The author also claims that evidence can't be examined until the police arrive. Not true. You can examine evidence from any of the rooms at any time. In fact, it's easier to remove it from the murder scene before the police get there. I know this is all in good fun, but aren't there reviewers who have at least played *Zork I* or *Witness?*

Nancy West
Eugene, Oregon

In From the Software Shelf, PC World *presents first impressions of recent software offerings. Our reviewers have free rein to examine any software "on the Shelf." While this approach differs vastly from the review process for a program like* dBASE III Plus, *we believe first-time experiences coupled with firsthand observations are valid in their own right. There's nothing wrong with a review examining a program from a beginner's standpoint as long as it states that fact.*
—Ed.

(continues)

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Fundamentally Opposed

I have a bone to pick with Stephen Blumenthal. In "Stock Market Analysis: Two Views" [*PCW*, March 1986] he states that "any securities analysis program worth its salt will update prices via a link with Dow Jones News/Retrieval, CompuServe, or another on-line stock pricing information service." The fact is that none of the leading fundamental analysis programs, including Isys Corporation's *Micro/Scan*, a program priced for professional investors, presently have such a capability. Even though Isys was recently acquired by Lotus Development Corporation, it remains to be seen whether *Micro/Scan* will integrate on-line pricing through *Signal*. For that matter, neither Value Line's *Value/Screen Plus* nor Standard & Poor's *StockPak II* has that feature.

Technical analysis packages are the only significant investment software products with on-line pricing capability. But to us fundamentalists, technical analysis isn't worth its salt. The charts do make unusual wallpaper, however.

N. Russell Wayne
Director of Marketing
Value Line, Inc.
New York, New York

Mr. Wayne is right about one thing—Micro/Scan *is definitely a product priced for professional investors. However, the* PC World *article is meant to explain the basics of fundamental and technical stock market analysis so that readers whose experiences range from casual to serious investing will know what to look for in popularly priced programs. It is not a review of products in those categories, nor is it intended for the high-powered professional who can afford to pay $10,000 for a stock analysis package.*

I've never seen Value Screen/Plus, *but there are numerous moderately priced fundamental analy-*

(continues)

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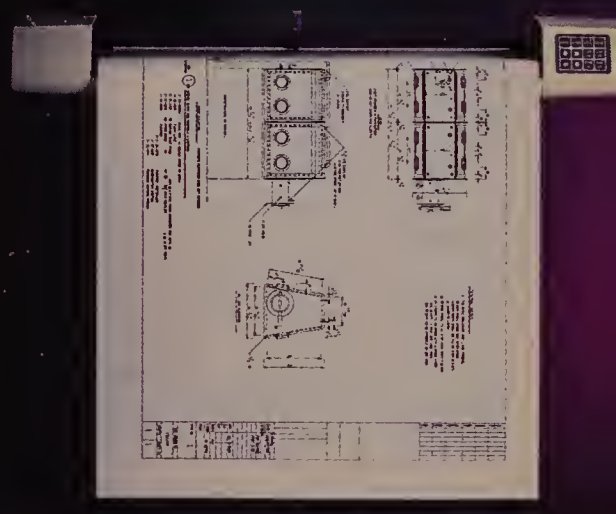

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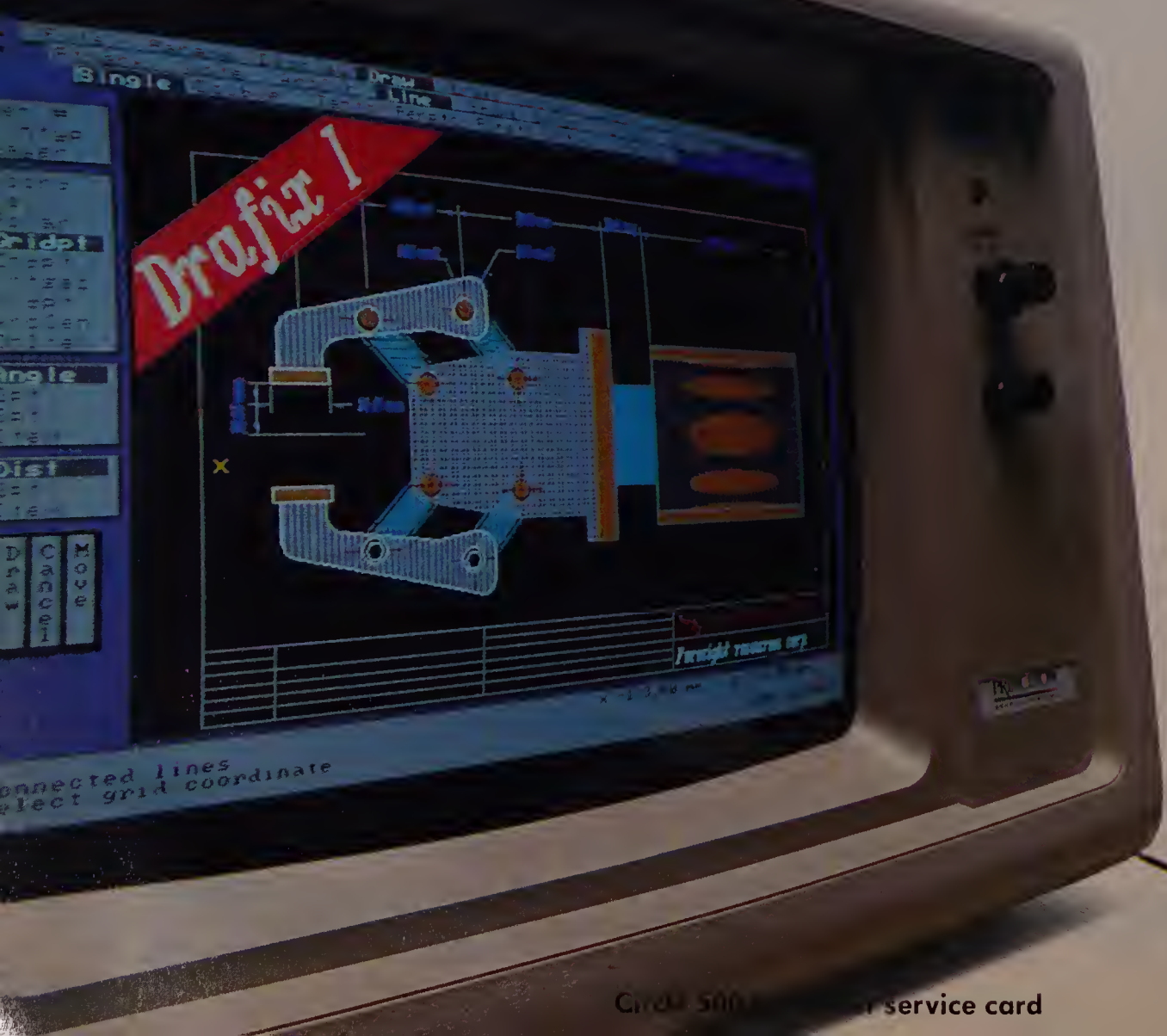

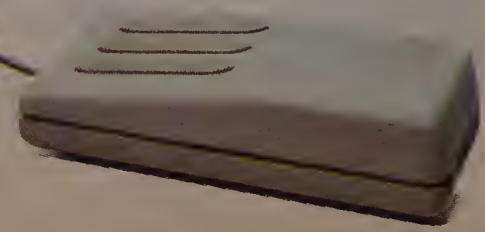

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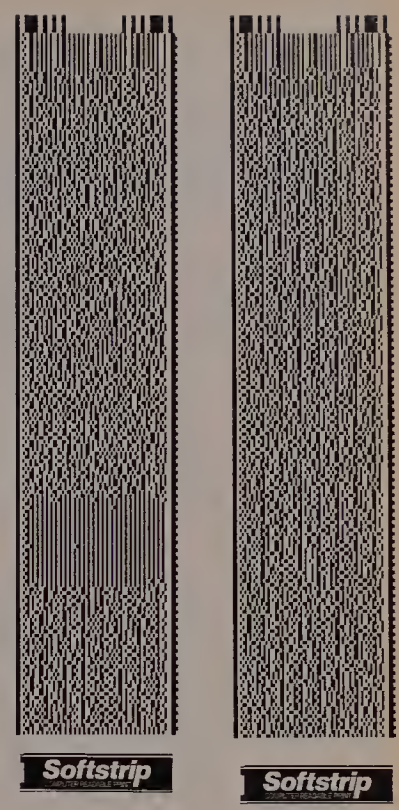

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sis packages, including Dow Jones/Irwin's Market Microscope *(which I mention in the article), that download on-line stock pricing information. I stand by the position that a program offering on-line access to information from Dow Jones News/Retrieval or any of the other commercially available data bases is a better value than one updated by disk, even* StockPak II. *–Stephen Blumenthal*

Dvorak Kept It Simple

John Dvorak's column "The PC and the Decline of Western Civilization" [*PCW*, March 1986] certainly brought home a problem I've had at work. I try to create programs that are menu-driven and easy to use, but I find myself adding so many features that I lose interest in writing the programs. After reading Dvorak's article, I decided to finish writing a program that keeps track of internal company expenses. Keeping simplicity in mind, I reduced the menu from nine to six functions. I later realized that the program could also track freight charges, which saved me the trouble of writing another one. I'll probably never stop adding features to my programs, but from now on, I'll keep them simple but effective and add the fancy features later–if I decide I need them.

Brad Stoddard
St. George, Utah

A Paradoxical Situation

As a member of the Ashton-Tate Corporate Advisory Board, I rely on *PC World*'s reviews to keep me honest. "A Most Ingenious Paradox" [*PCW*, March 1986] was either ill timed or poorly researched. A comparison of *Paradox* to *dBASE III* would have been useful in September 1985. But since *dBASE III Plus* made its debut in November, a more meaningful comparison would have been *Paradox* to *dBASE III Plus*. The announcement of *DataEase* release 2.5 further dilutes your *Paradox* review. With the breadth of applications and the frequency

(continues)

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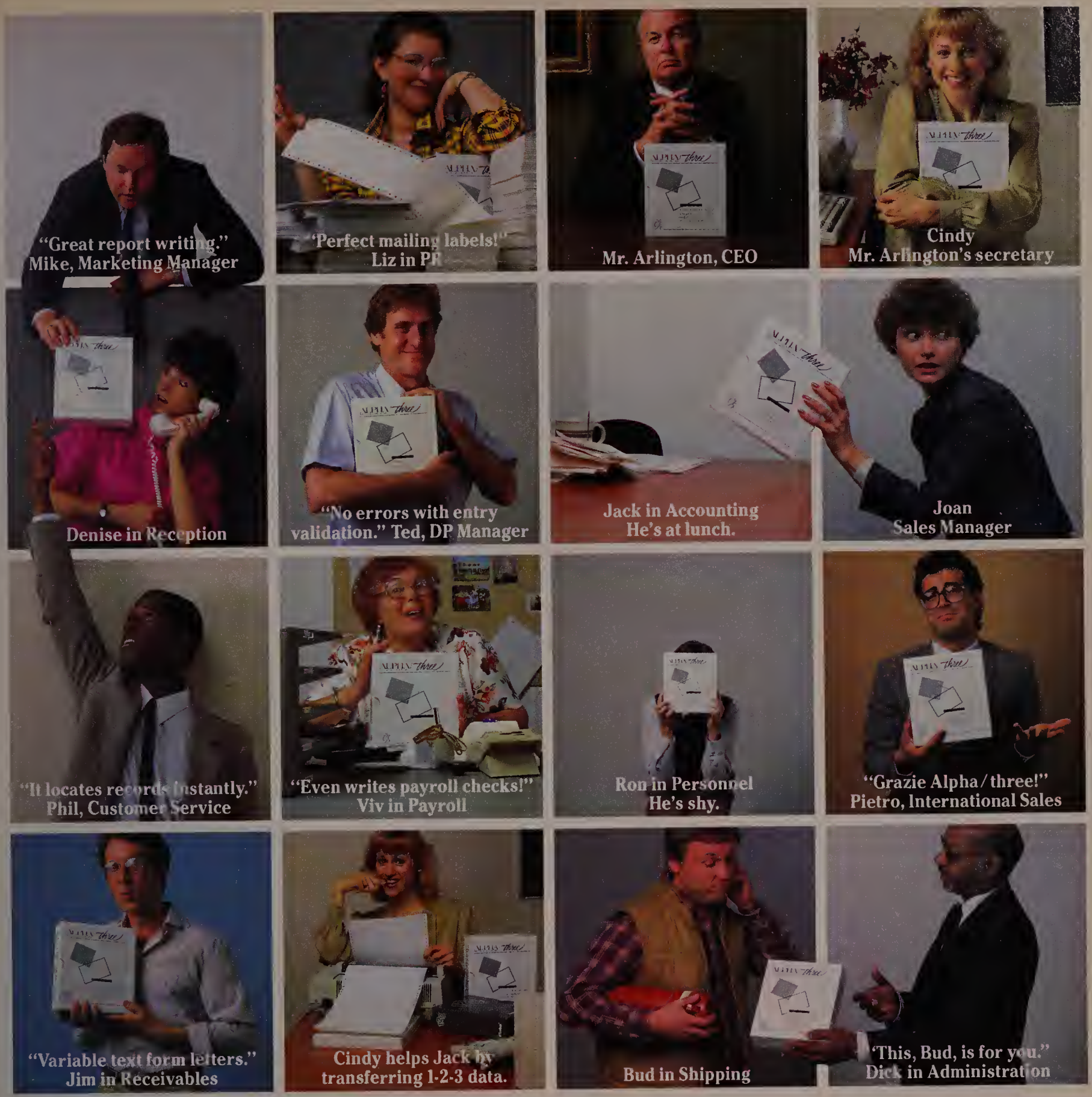

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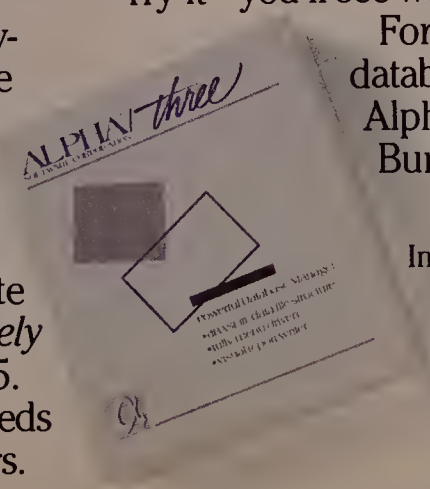

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of change in personal computer technology, objectivity and timing are both of the essence.

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Manager, Personal Computer Dept.
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As is often the case, both dBASE III Plus *and* DataEase *release 2.5 had been announced but not released when* Paradox *was reviewed, hence our comparisons with* dBASE III *and* R:base 5000. PC World *will likely examine updated versions of all three of these packages. —Ed.*

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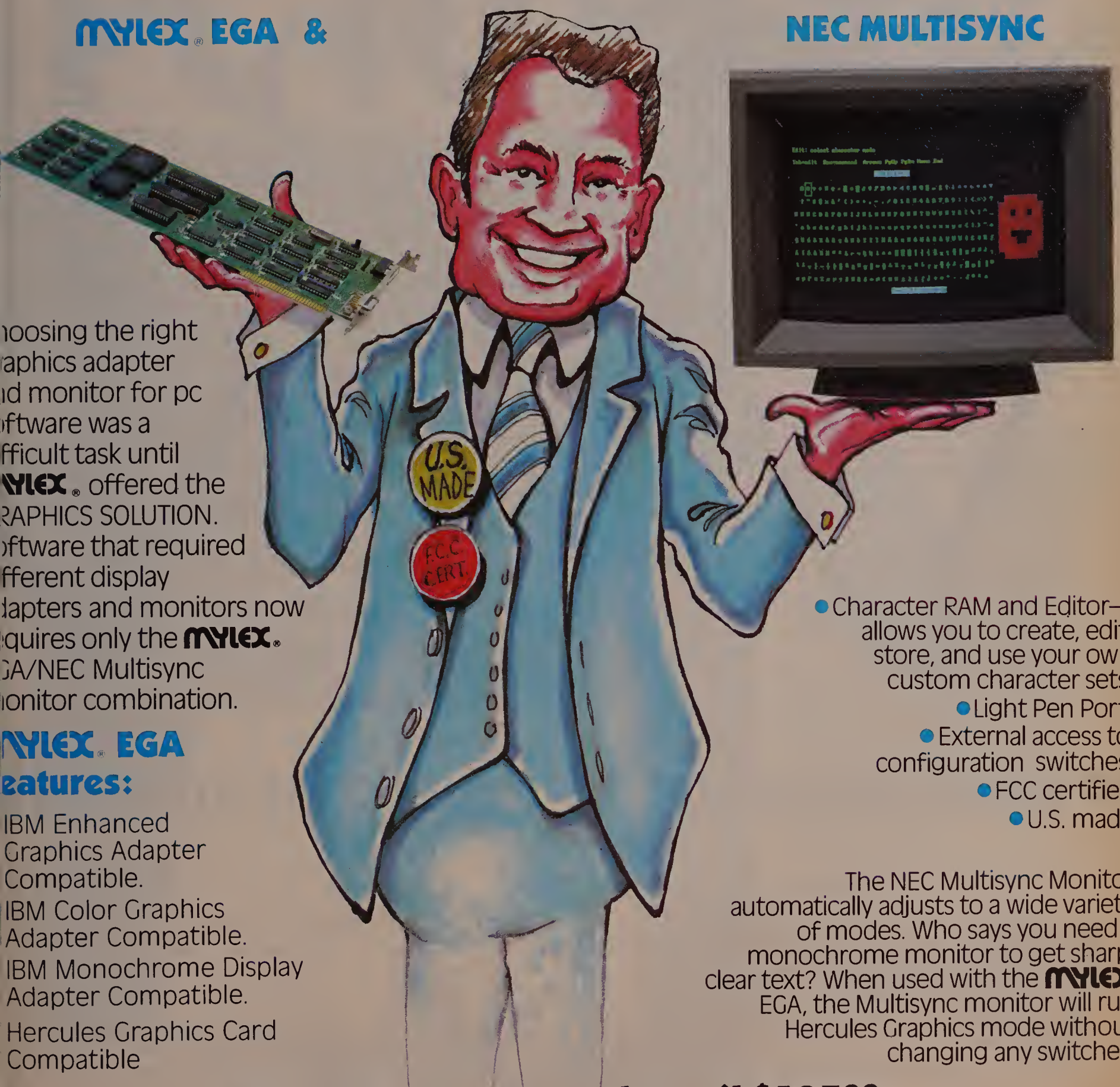

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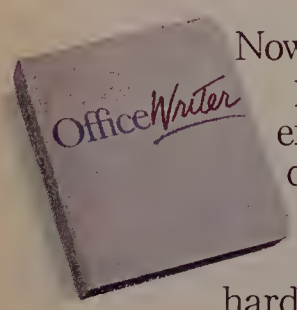

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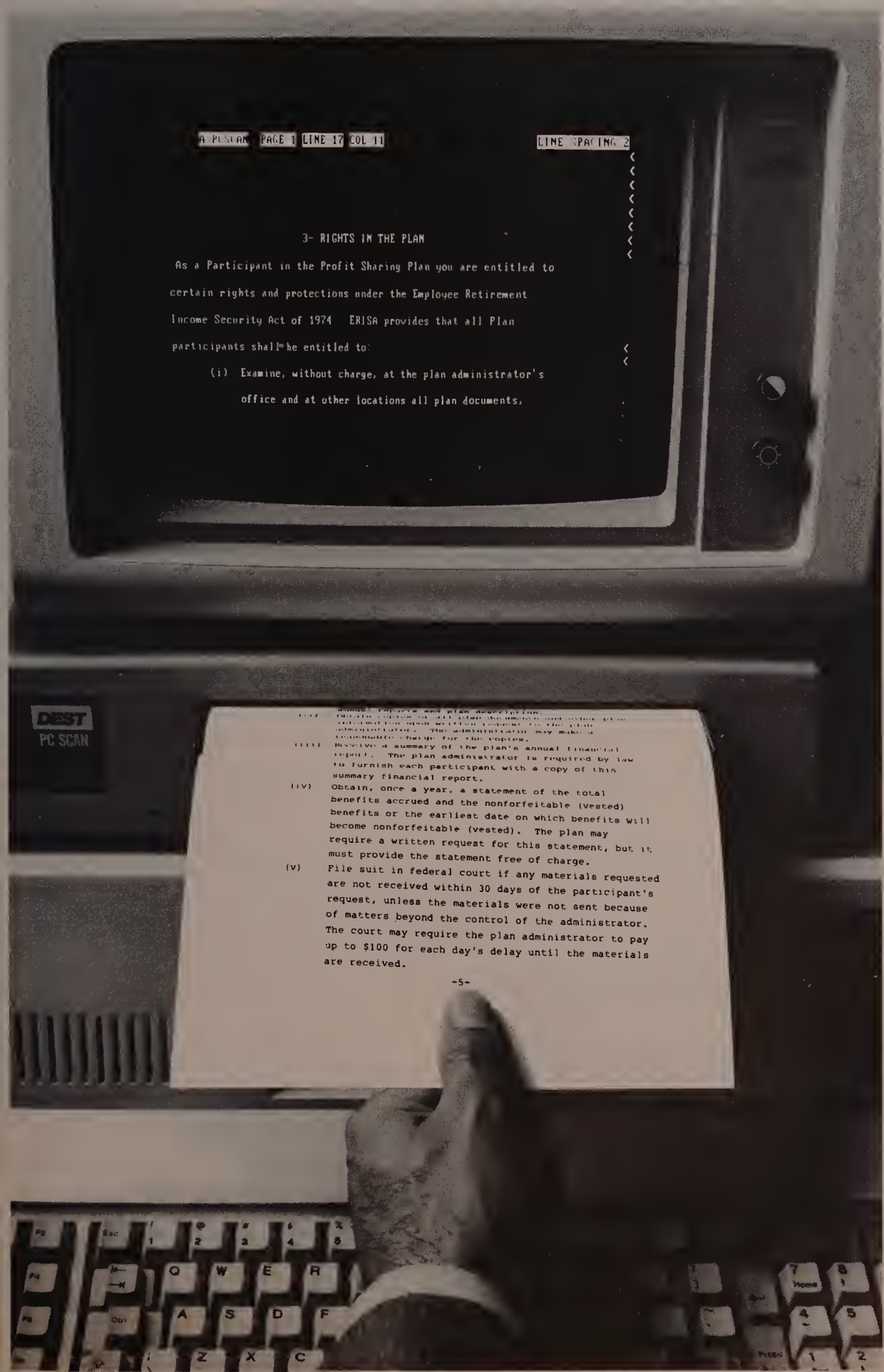

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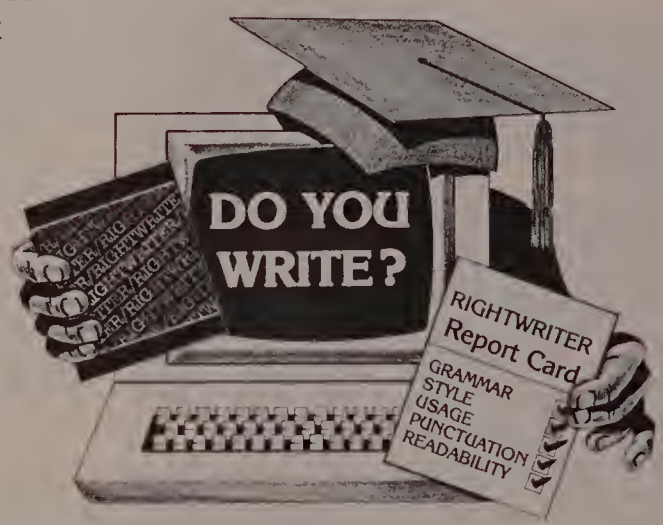

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Population Bomb

David Bunnell's PC must have blown a circuit when he wrote in "The China Interface" [*PCW*, February 1986] that "China is about the same size as the United States, but its population is about 15 times our own." It's true that China has a serious population problem, but if it had a population 15 times greater than America's, there'd be almost 3.5 billion Chinese in a total world population of some 4.5 billion, and 78 percent of all humanity would be Chinese.

Robert Storey
Tainan, Taiwan

Thanks for the correction. While the Chinese have accomplished some remarkable things, we admit this may be too great a task even for them. The Information Please Almanac of 1986 *reports China's 1985 population as 1,041,346,000 people, approximately 4 times that of the United States. —Ed.*

Letters should be mailed to Letters, PC World, *555 De Haro St., San Francisco, CA 94107, or sent electronically to MCI Mail PC-WORLD, CompuServe 74055,412, or The Source STE908. We reserve the right to edit letters. All letters must include the writer's name, city, and state and should not exceed 300 words.*

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Circle 701 on reader service card

Before you invest in a DEC*VT240 terminal, consider the software alternative.

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persoft

Circle 142 on reader service card

Daniel J. Rosenbaum

REMark: Token Freedom

IBM's new local area network may be the revenge of the MIS manager and the end of freedom of choice for PC users.

To hear some people talk, IBM's Token-Ring network represents an advance in corporate computing that ranks right up there with the IBM PC itself. They may be right, but the network's real importance is that it could very well herald the end of corporate desktop computing as we know it today. Corporate PC users should view the Token-Ring network with about as much enthusiasm as Dracula viewed wooden stakes. MIS managers, however, see it as the coming of the Seventh Cavalry.

The Token-Ring network will bring about a fundamental change in the politics and practices of personal computing in the office. The losers are likely to be the people with PCs on their desks. The winners will probably be the MIS departments—and, by extension, IBM.

By nature, PCs are a threat to many MIS departments, which over the years have carved out a powerful bureaucratic niche as the Holy Protector of Corporate Data. It is plain that the philosophy behind PCs and the philosophy behind centralized computing installations are completely at odds.

In point of fact, PCs have proved to be a real pain for most MIS shops. Employees bought desktop machines without the benefit of guidance (or approval) from the data processing pros, then started to drain already thin DP resources by demanding support for an astounding array of incompatible software. Even worse, some people began asking for access to corporate data stored in the mainframe.

From the perspective of old-line MIS managers, PCs are not secure, they are not standard, and they give users just enough computing power to get them into trouble—trouble from which the MIS department will be asked to rescue them. It is not uncommon for big MIS shops to have application backlogs that will take years to handle; the DP staff simply has better things to do than to swap out your memory chips.

PC users, in effect, are asking for the rights and privileges of a corporate DP infrastructure with none of the responsibilities.

(continues)

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Circle 660 on reader service card

Clearly, that is a political threat to the people who have spent careers setting up that system. Unfortunately for the MIS folks, stamping out PCs has proved about as easy as stepping on all the ants at a Sunday picnic. Besides, enough executives at sufficiently elevated levels of corporate management have begun using the things, and no DP manager in the world is going to tell a boss that he can't do something with a computer. Like it or not, the MIS manager is stuck with PCs.

The issue, remember, isn't one of utility; it is one of control. Even the most backward MIS manager realizes that PCs are useful critters. Trouble is, they're not under centralized control the way the rest of a company's computers are. And when you talk about DP control, you're talking about IBM. The relationship between IBM and the MIS manager is a strange and wonderful thing, sometimes the stuff of deeply convoluted Greek drama. Suffice it to say that IBM gives MIS managers the reliable tools and the support to spread their DP empires, and MIS managers in turn keep buying IBM products. IBM and MIS managers probably could not exist without each other.

Into that picture comes the IBM PC—blissfully unconnected to anything but its own peripherals. Its nameplate bears those three revered initials, so the MIS folks can't complain too loudly, but it's still a personal computer. Has IBM forsaken its priests in favor of the great unwashed?

(continues)

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Circle 528 on reader service card

O, thou of little faith. The Token-Ring network is the MIS manager's counterattack. It's a way not only to link all the rogue PCs into a neat daisy chain but to hook them into the mainstream of the corporate mainframe world. Here's the means to turn all those PCs into very expensive, very intelligent terminals. Never mind that a minicomputer, cables, and conventional terminals may cost less than a Token-Ring while providing more computing power. Install a Token-Ring, and presto! Instant centralization, and the users still have their PCs.

Everyone's happy, right? Well, no. Hook together the PCs, and there is a whole new set of issues to address, all of them boiling down to essentially one: Whose network is it? The users say, It's ours. We use it. MIS says, It's ours. We bought it, we installed it, we maintain it, we hook it into the mainframe.

Who wins? Figure it out. The MIS shop is an approved and expensive corporate organization. The users are like their machines —connected to nothing but themselves. And as anyone with experience in politics knows, an organized interest will always beat an individual interest.

There appears to be nothing in the Token-Ring that would keep you from using your own software for your own purposes. Unless, of course, the software doesn't run with the network. Unless, of course, you have to bid for space on the network's hard disk. Unless, of course, the drive to swap

(continues)

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Don't let its size fool you.

The T3100 is less than a third the size of the Compaq™ Portable II, yet every bit as powerful. It uses the same 80286 microprocessor as a full-sized IBM PC-AT, and is fully IBM compatible, so you can continue to share data with the other PC's in your office. The T3100's 10MB internal hard disk gives you ample storage for sophisticated applications, and the ability to take high volumes of information anywhere you go. You'll work comfortably with the T3100's full-sized 81-key keyboard. And Toshiba built in a full-sized, advanced gas plasma screen to give you the clarity and brightness of a CRT display—without the bulk.

Out of sight: Try putting one of last generation's desktop AT computers into a drawer!

More memory for more applications.

The T3100 runs the most popular software applications written for the IBM PC/XT™ and IBM PC-AT. Its full 640KB RAM enables you to work with integrated financial and analysis programs, large spreadsheets, lengthy documents, electronic filing and more.

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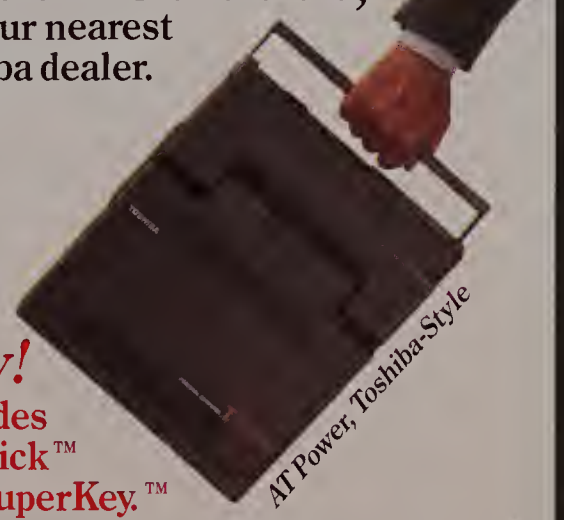

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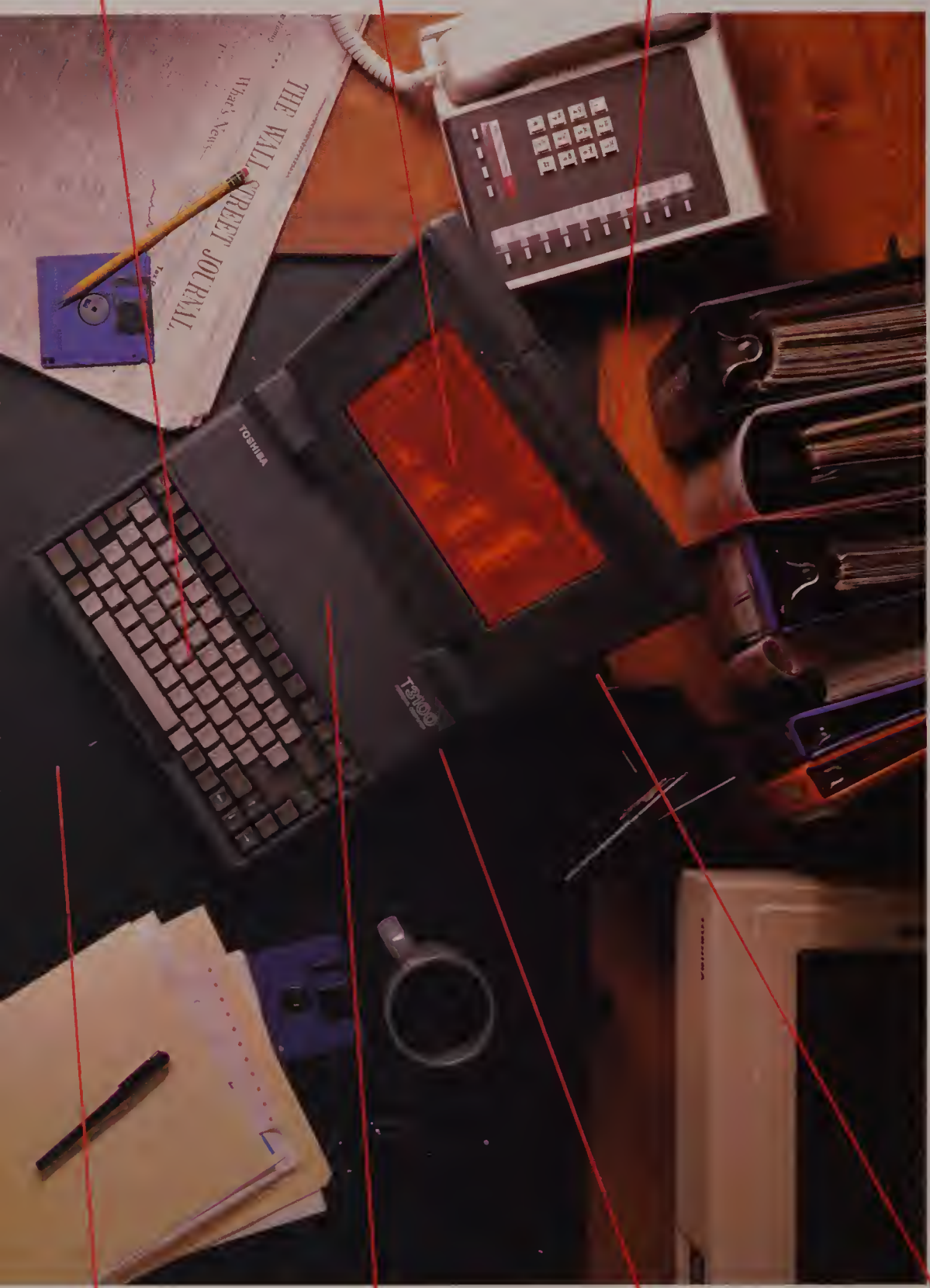

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data with others on the net requires you to abandon your favorite package for the one everyone else uses, or the MIS department fails to put your software on the "approved" list.

So what can you do? You can resist the coming of networks, but that might be a long and losing proposition. You can simply try to live with the new regime but at the risk of losing your own personal and quirky way of doing things. Or, you can try to co-opt the network—make sure that whatever standardization that happens includes your own equipment and software.

There's danger in that last course of action, though. Your job is your job, not some adjunct MIS function. If you're the local PC guru, you may find yourself spending an increasing amount of time maintaining and administering the network. At that point, the MIS department has won; it's expanded its influence, budget, and personnel—and at your expense. Suddenly you find yourself painting someone else's white picket fence.

Networks should allow communication and the free interchange of data; they should not be used as a cudgel to force the stand-alone world into an unwanted conformity. The networks are coming; you can bet on it. Your reaction and planning today will affect the way you use your PC tomorrow.

Daniel J. Rosenbaum is executive editor of Wiretap, *a monthly analysis letter covering the information industry.*

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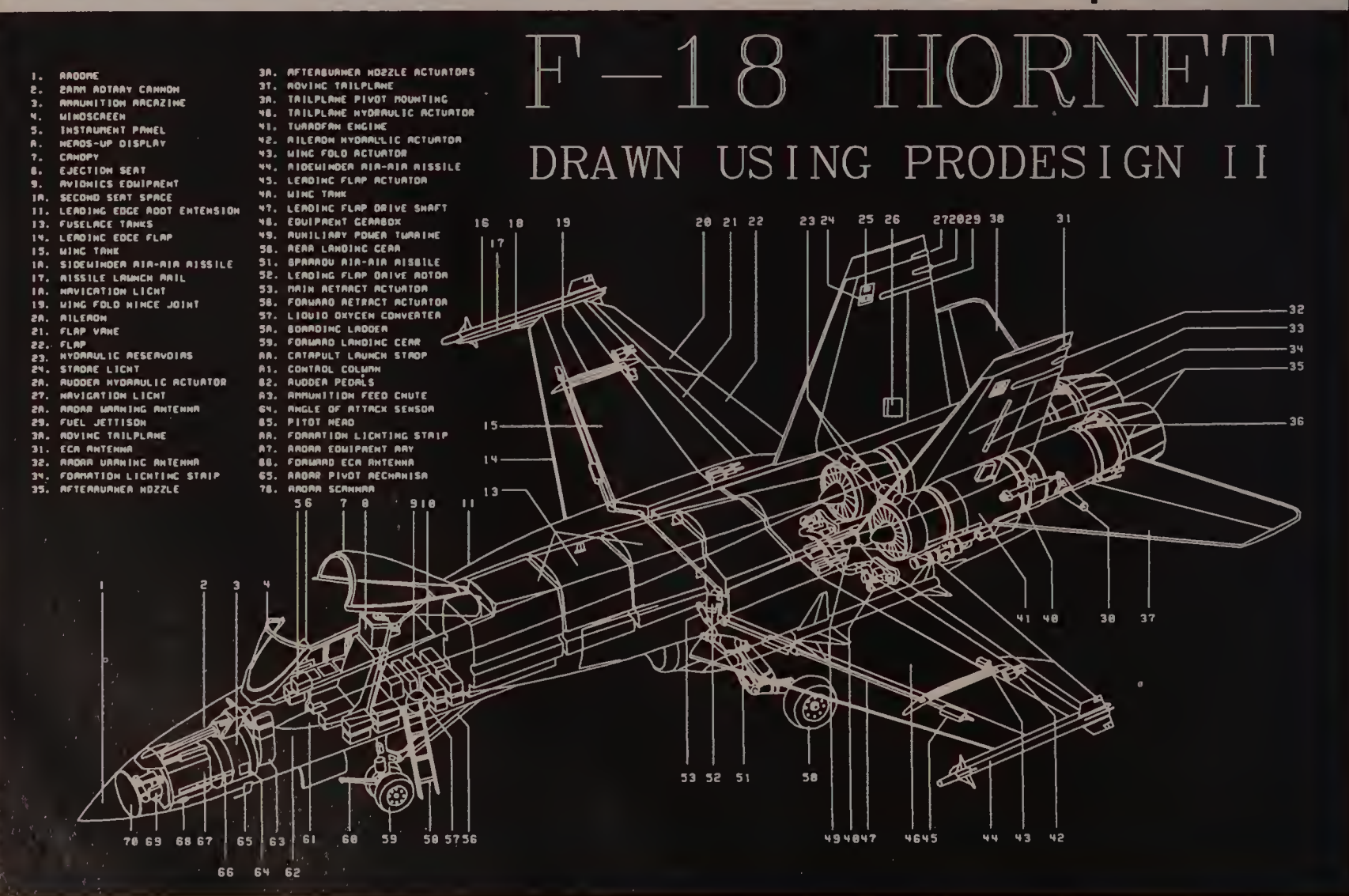

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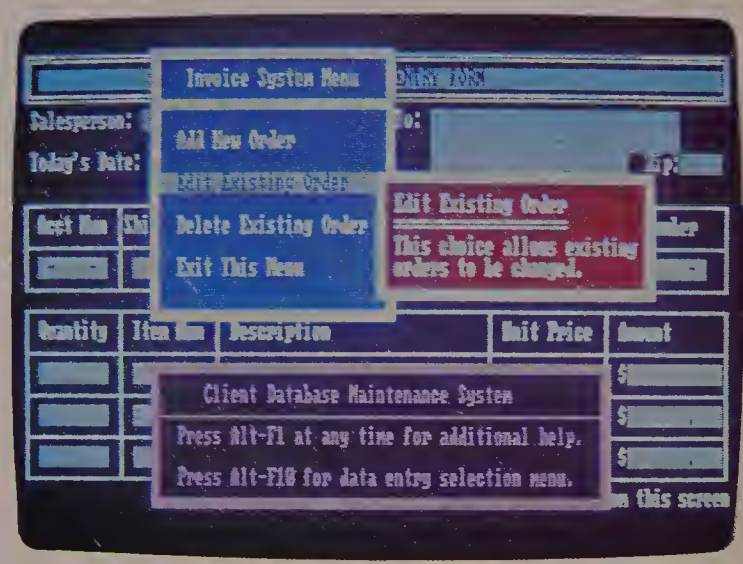

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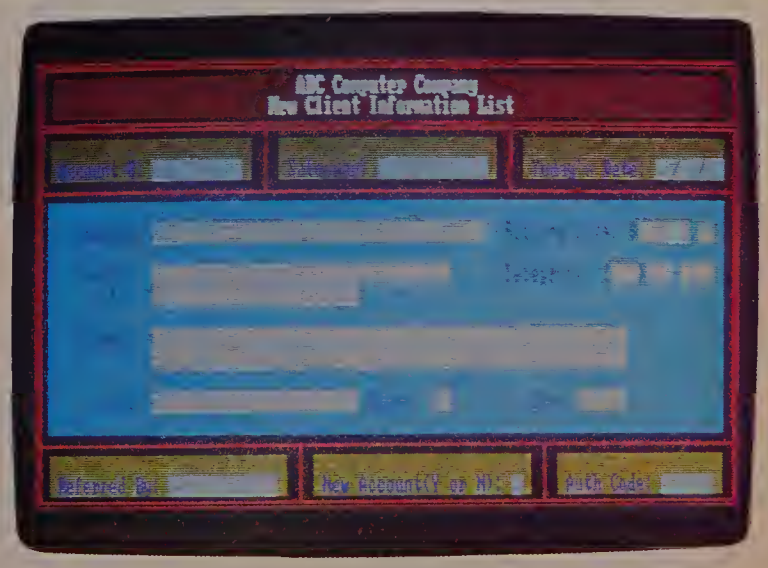

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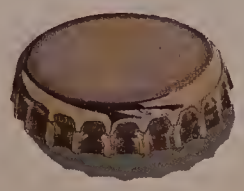

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In the high-pressure corporate environment, every move counts. It's no wonder, then, that many corporate PC users are reaching for WordPerfect for powerful business word processing.

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WordPerfect is now the best-selling word processor for the IBM PC, according to market research firm InfoCorp. And customers like Ford, Chrysler and TRW are leading the way.

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But WordPerfect's climb to the top was no overnight success story. For the past three years, user feedback has been applied to each new version of WordPerfect, pushing it closer and closer to perfection.

The result is WordPerfect 4.1, a word processor with unsurpassed business features for the IBM PC and compatibles. Features like an elegant thesaurus, a 115,000-word spelling dictionary, math capabilities, columns displayed side-by-side on screen, windows, line drawing, paragraph numbering, and extensive printer support.

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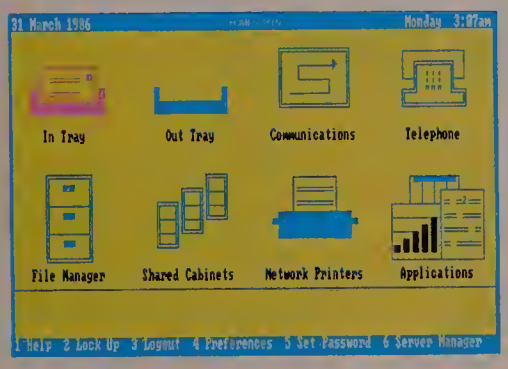
A remarkable breakthrough for LANs–one that's easy to use: Tapestry

No matter what local area network hardware you choose—your next choice should be Tapestry network operating software from Torus Systems. Here are 6 reasons why.

1 IBM chose Tapestry, for its overseas market, and it quickly became the hottest LAN system in Europe.



This is the friendly screen that caught Big Blue's eye.

2 It's the world's easiest-to-use networking software—much simpler than Novell, 3Com, or IBM because Tapestry is managed with icons. To use it, you just point to graphic symbols: the "in-tray" to get mail, the "cabinet" to access files, and so on.

You even use icons to configure the system, so almost anyone can set up a Tapestry network—and keep it running smoothly.

3 Tapestry is the most complete LAN software money can buy. The basic system gives you:

- **Advanced electronic mail**

Compose memos with the Torus text editor. Send them to any person or group on the network, just by pointing to names. Track the mail you've sent. Get messages instantly.

- **Cost-effective sharing of hard disks, printers and modems**

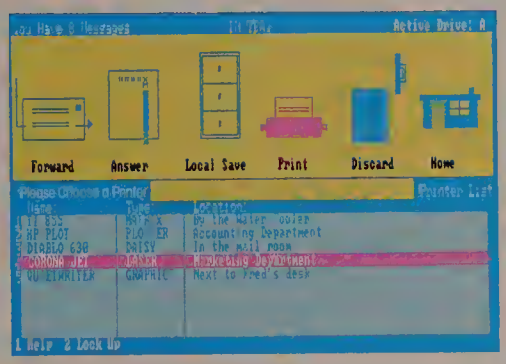
You can have up to 100 Tapestry workstation/servers and access any one of them by touching the right icon. Since all Tapestry servers are undedicated, each station is free for business as usual. You don't have to invest in specialized hardware, or sacrifice your valuable PCs.

- **Advanced communications capabilities**

Need information from the company mainframe or an outside service? Just point to the desired Service icon. Torus offers a family of network gateways* that automatically make the connection and speed your information through.

- **And there's more!**

Tapestry also provides central storage of all your applications so they too can be accessed with icons. Automatic file locking so you can safely run single-user applications not originally designed for networks. File Manager icons that let you manipulate files without using DOS commands. And a Telephone Manager that places your calls and maintains a personal electronic rolodex.



What good is a network if your people don't know how to use it? Tapestry's screens are so easy to understand, anyone can net great results without special skills or training.

4 Tapestry supports all the standards, like IBM Token-Ring, PC Network and 3Com hardware. Like PC-DOS 3.1 and NETBIOS. So you can choose the LAN hardware that's best for you, and you won't have to worry if your software will run.**

5 Tapestry is proven and reliable. Thousands of Tapestry stations have been installed in both large and small companies in the U.S. and around the world. Customers include: Proctor & Gamble, EDS, the White House, the IRS, Prime Computer, TRW, NBC News, Shell Oil, Exxon and Citicorp.

6 With this coupon you get a FREE Network Manager AND a money back guarantee!

Usually, Tapestry costs $495 for your first workstation (the Network Manager) and $295 for each additional station.† BUT NOW YOU CAN GET A TAPESTRY STARTER PACK (BOTH THE MANAGER AND THE SECOND STATION) FOR ONLY $295!

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System Requirements: Station 1: IBM PC, XT, AT or compatible 384K, 10MB hard disk. Station 2: IBM PC, XT, AT or compatible 320K. Plus suitable networking hardware.

Notes: *ASYNC is standard, while VT100, 3270 SNA, and Remote Access are purchased separately. **Tested applications include: dBase III Plus, MultiMate Advantage, Open Systems Accounting, Displaywrite 3, WordPerfect, MS Word, Lotus 1-2-3, AutoCAD.

†6 Station Pack—$1495, 24 Station Pack—$3995.

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PC WORLD

The Thrill of Upgrades, the Dread of Obsolescence

It's summer 1986—do you know where your latest version is?

Quick now—what version of your favorite word processor are you using? When was the last time the publisher of that communications package apprised you of a new release? What was it like being the last in your office to learn that your spreadsheet had been recalled?

PC World View *reports new developments in computer technology, items of interest to computer enthusiasts, and the most significant and enticing insights about industry trends and personalities. —Ken Greenberg*

Where software upgrades are concerned, there's no rest for the weary corporate user. Still, neither bugs, bucks, nor threat of downtime keeps users from moving up to the latest and greatest in software. In so doing, however, users haven't been shy about airing their gripes on issues of pricing, update frequency, compatibility, and logistics.

The good news is that software vendors are scrambling to discover efficient upgrade procedures that will answer customer needs without undercutting profits or risking the wrath of loyal users.

In a perfect world, new releases would be superfluous. In a near-perfect world, being a registered owner would mean free access to the newest iteration of a program—a solution Ira Weise of 800-Software, the Berkeley, California, distributor, enthusiastically endorses. In the real world, upgrades aren't a (cheap) concomitant of registration: *1-2-3* release 2 went for $150, *Framework II* for $140, and others aren't far behind.

W. E. Peterson, executive vice president of WordPerfect Corporation, believes that upgrade costs should never exceed 10 percent of the initial purchase price. Peterson insists "unreasonably" high prices "do a disservice to the industry—and make upgrading hard for some companies."

View

News and notes for the computing community

Mort Rosenthal, CEO of Corporate Software, a Cambridge, Massachusetts, distributor, agrees. "Publishers haven't been terribly responsive to the way large companies usually go about acquiring updates," he says. "Lotus, for example, requires a hundred units for a volume discount. Large companies have that many units but usually not all at one location."

With the shelf life of software releases hardly extending beyond the time it takes to discard the shrink-wrap, the frequency of updates also irks users. That's particularly true when bugs spring up in new, supposedly "purer" versions of popular programs. "Software design is a dynamic, creative process," says Peterson. "Users expect new versions to be cleaner, more mature, easier to use."

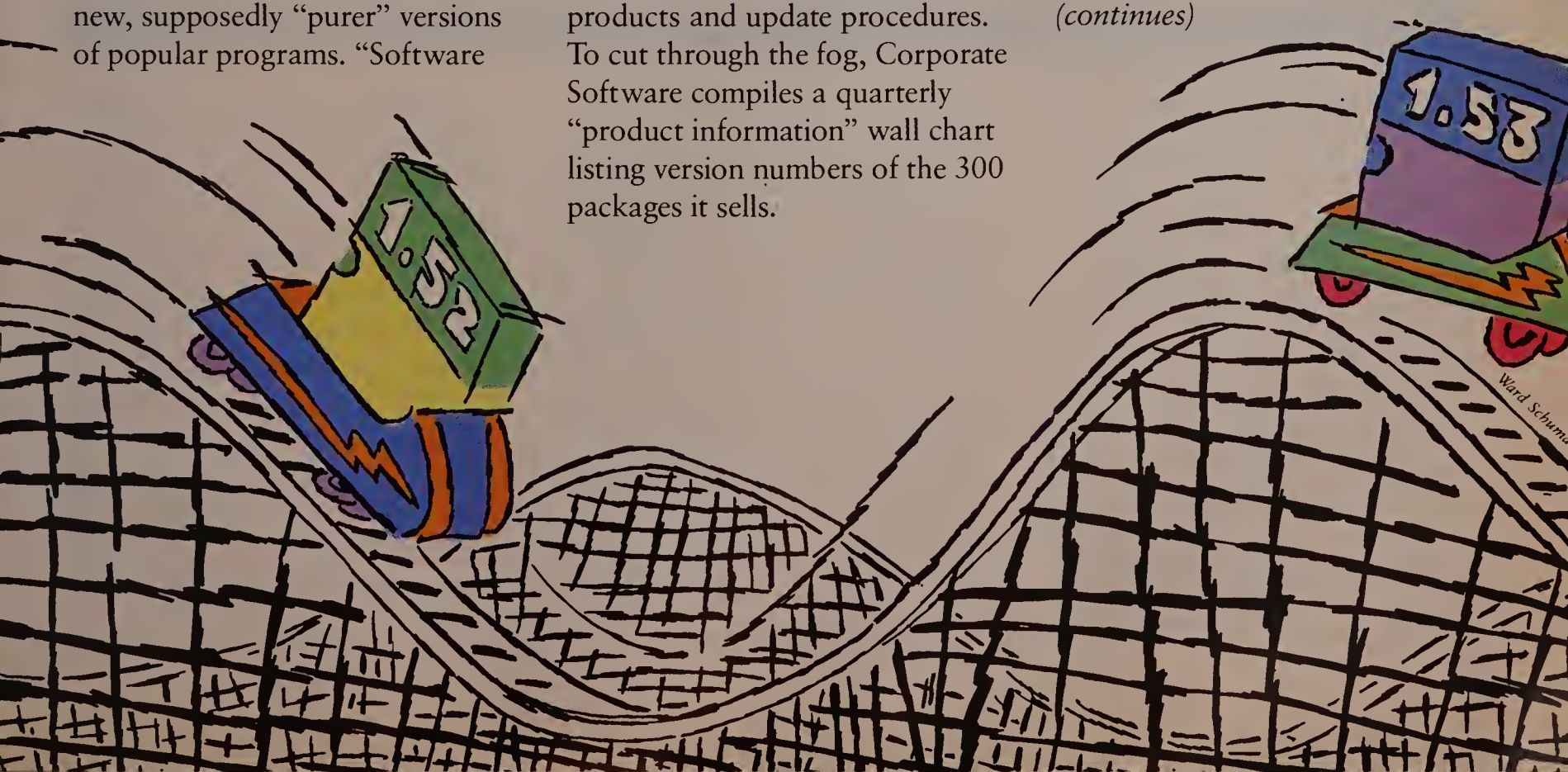
WordPerfect, ironically, is a prime example of not letting any grass grow between releases. No sooner had the ink dried on rave reviews of version 4.0 than the company unveiled 4.1–an enhanced winner, to be sure, but yet another rainbow for 4.0 users to chase.

Corporate Software's Richard Loftin notes that would-be users of upgrades often lack adequate information about revamped products and update procedures. To cut through the fog, Corporate Software compiles a quarterly "product information" wall chart listing version numbers of the 300 packages it sells.

Enlightened vendors, mindful of the confusion, are taking steps to banish it. Microstuf–now on its 16th revision of *Crosstalk*–recently sanctioned on-site updates of master disks and documention for installations with 100-plus users. Microstuf's approach is considerably more than a convenience, what with the usual requirement to ship documentation and disks back to the factory.

And what if newer isn't necessarily better? Following Lotus's unexpected emulation of Coca-Cola–tinkering with a tried and

(continues)



Big Blue's News

IBM's marketing prowess is, in its own way, on a par with the infallibility of the Celtics or the inevitability of tomorrow's sunrise.

So the notion that IBM—with more than 1.8 million PC sales rung up—is doing a less-than-sterling job of selling personal computers to its own corporate customers is, well, vaguely blasphemous.

That, nonetheless, is the word from one market research oracle. In a recent nationwide survey, Dataquest, the San Jose trend tracker, found that IBM's historic mainstays—companies that own and lease IBM minicomputers and mainframes—were twice as likely not to have personal computers as companies that owned big systems with another company's logo on them.

The finding certainly jolted Dataquest analyst Suzanne Purnell. "I expected to find loads of IBM PCs," she confesses. The company's national survey of 147 MIS managers at Fortune 100 firms, government agencies, universities, and hardware vendors revealed that PCs were nowhere to be found in 19.2 percent of the IBM shops. A scant 9.5 percent of the companies committed to large systems from vendors like Burroughs, DEC, Honeywell, or Sperry lacked PCs. "PCs are not as ubiquitous as many assume," she concludes.

Purnell speculates that IBM's showing reflects the tendency among its direct sales force to concentrate their efforts on promoting higher-margin multiuser machines, minis, and mainframes ahead of PCs (where profit margins continue to dwindle). Dataquest also theorizes that MIS managers may harbor a residual bias against personal computers; data processing pros exert tighter control over users with dumb terminals.

She admits being "astounded" by one other finding: how very few PCs most large companies have. Ten percent of the companies with 1000 or more employees had no PCs, and 37 percent had fewer than 11.

The data processing behemoths may do certain big jobs well, but users have found they lack the PC's workaday steadfastness. The Dataquest sample reported that their mainframes delivered ample power but often lacked the simplest functionality. Some 72 percent said multiuser machines did not support their PC application of choice. The response was even worse for IBM customers, 87 percent of whom said their primary PC application was unavailable on the more formidable IBM computer.

All of which ought to be food for the thoughtful marketing types at Armonk. *—John Eckhouse*

The Thrill of Upgrades . . .
(continued)

true formula in *1-2-3* release 2—users have ceased taking compatibility on faith. Peterson suggests some companies "are now afraid to upgrade" and that the software selection process, even in departments that have seemingly settled on several major products, is now mired in layers of bureaucracy. Says Corporate Software's Rosenthal, "The *1-2-3* upgrade created as many problems as it solved."

Although site licensing may not entirely fix the various problems attending upgrades, it seems to help. Microsoft's site-license agreement, for example, includes automatic notification of upgrades, flexibility in ordering, plus training, support, volume discounts, and streamlined upgrade procedures. Says Jeff Raikes, director of applications marketing, "Our site-license program has been very well received."

Software upgrades belong with death and taxes, although they continue to be welcomed more than scorned. Peterson advises that users simply wait a few weeks after a release before buying the newest version on the block. "Make sure it's been worked through elsewhere," he admonishes. And keep your fingers crossed. *—Barbara Clavan*

Read a Disk, Save a Tree

Even with roughly half-a-dozen years of office automation under our collective belts, the world is still moving tortoiselike toward the paperless office. Not so, however, the paperless magazine.

PC Life from Microstar Graphics is the latest entry in a hybrid literary subgenre known as the disk magazine. This is a contender with a few twists—spiffy graphics, bright writing, and packaging that's a blend of *GQ* and *Vogue*.

Editor and publisher Mike Sullivan believes top-notch animation combined with informative features and glamorous presentation will encourage readers (viewers?) to make the transition from printed page to PC screen.

Animated 320-pixel-by-200-pixel four-color graphics are indeed the highlight of *PC Life*. Schooled as a magazine illustrator, Sullivan uses Lifeboat Associates' *Dr. Halo* and Brightbill-Roberts & Company's *Graphix Partner* and *Show Partner* to imbue *PC Life* with a touch of the Avenue of the Americas.

Still, *PC Life* isn't all glitz and no grits. The premiere issue features an article on Novell's Netware, complete with an animated pictorial of an eight-station network in operation. Also in the issue are a discussion of the historical development of the PC, a review of the Epson Equity I, and a peek at *Microsoft Windows,* all accompanied by vivid illustrations. The bimonthly publication will regularly include $100 in coupons and rebates, with an occasional utility program or game.

Sullivan says disk magazines have one advantage over their paper-based counterparts. "After you read *PC Life,*" he says, "you can always reformat the disk."

That's not a bad idea in the case of *Diskette Gazette,* another new—albeit far less sophisticated—disk magazine. Editorial copy for a "sneak preview" issue was filched from *InfoWorld* and a few other real-life publications. Ready, set, format B: . . . —*Wes Nihei*

An Idea Whose Time Has Come

No doubt about it—the 3½-inch floppy disk format has a robust future. Just the other day, we encountered a detailed, 18-page position paper from Hewlett-Packard extolling the virtues of the more compact media. Entitled "Why the 3½-Inch Microfloppy Will Be the Next Industry Standard," the paper assays the format—compellingly—on its capacity, performance, reliability, ruggedness, and price.

Indeed, if you looked quickly, you might have missed the May 1984 date on the report's first page.

The Jam in RAM

In DOS's cramped 640K anatomy, the knee bone isn't connected to the thigh bone—although with a little patience, it soon may be.

Sandwiched in memory by application programs and a bewildering batch of similarly ensconced utilities, the so-called terminate-and-stay-resident (TSR) programs—"pop-ups," if you will—are convenient instant-access tools. They're also the source of an increasingly nasty traffic jam in the narrow confines of RAM.

Problem is, RAM contains only so much room in which to park programs, and only so many desirable keystroke combinations are available to invoke TSRs (see "Battle for the Background," *PCW*, June 1986). The clash of TSRs with application programs and each other can produce apocalyptic results: system crashes, locked keyboards, psychedelic displays, lost data.

In the arcane world of DOS interrupts—where TSRs live—it's been every software developer for itself. Solutions to compatibility issues are as plain as DOS, which could be why MCI Mail was crackling earlier this year with an exchange on how to keep peace among TSRs and popular applications.

Microsoft began by circulating a set of proposed guidelines for memory-resident software. Borland International's Philippe Kahn and Living Videotext's Dave Winer immediately countered with suggestions of their own, setting the stage for last spring's RAM-Resident Software Conference, cosponsored by Microsoft and Softronics (publisher of *Softerm*, a RAM-resident communications

David Bishop

package). Convened around the time of the Tokyo economic summit, the conference drew representatives of more than 100 software publishers intent on trying to uncram RAM.

While the Colorado Springs confab resulted in no formal communiqués (or standards), Microsoft has consented to be a bit more forthcoming about DOS interrupts. According to David Rose, creator of *ProKey*, that alone constitutes a big step toward developing consistency among RAM-resident programs.

Rose took an additional stride by joining forces with Roger Schafly of rival Borland (whose *SuperKey* butts heads with Rose's popular keyboard enhancer). The collaboration should result in the creation of a generic interrupt handler to quell conflicts that occur when more than one program tries to take over the keyboard.

John Socha of Peter Norton Computing went back to Santa Monica agreeing to produce a generic data "billboard"—formally known as a program identification record (PIDR)—that, when added to RAM-resident software, will provide information to anyone seeking cooperation among multiple TSRs. Says Borland's Schafly, "The PIDR opens the door for a new type of software product—the RAM-resident software manager."

As it happens, Borland came prepared to distribute free copies of just such a program, a memory organization manager called *MOM*. *MOM* is a TSR that loads and unloads other TSRs and "deactivates" a TSR while leaving it resident. It also creates an on-screen list of programs in RAM, their loading order, how much memory they use, and how much remains for applications.

(Borland claimed that *MOM* is only a kindly research venture and denied plans to market the product. The version on display works only with Borland's *SuperKey*, *SideKick*, and *Turbo Lightning*.)

In the absence of a TSR standard, developers will have to make do with, in David Rose's words, "public information for anyone who wants to use it." That, however, appears sufficient for Turner Hall Publishing, a subsidiary of Symantec. The company has incorporated TSR compatibility in *SQZ*, its new *1-2-3* worksheet compression utility.

The end of turbulence in RAM is tantalizing—and apparently reasonably close at hand. Says Dave Winer, "Anyone planning to sell a RAM-resident product can no longer afford to ignore compatibility." —*Wes Nihei*

Garlands and Glitches

PC World View's *picks and pans in the PC parade.*

▼ ***Glitch*** Leading Edge Products, conduit for the hot-selling, Korean-made Model D PC compatible, for biting the hand that praised it. Leading Edge earned a niche on *Consumer Reports'* "dishonor roll" after bragging about *CR*'s laudatory review of the Model D in its ads—a brazen contravention of the magazine's longstanding "no commercialization" policy.

▲ ***Garland*** IBM, for offering PC users far and wide its technical directory—gratis. This slim catalog of IBM's burgeoning technical reference library covers every member (and every component) of the PC family. The directory also itemizes documentation for BASIC, DOS, *TopView*, and graphics tool kits. Call 1/800/IBM-PCTB.

▲ ***Garland*** Both Microsoft and AT&T, who've voted with their considerable pocketbooks to terminate their South African trade. AT&T quietly shut off its export of computer hardware to the apartheid regime, while Microsoft severed ties with its South African distributor. IBM, meanwhile, at least began to think about the subject out loud. At the company's annual meeting, outgoing chairman John Opel described conditions in South Africa as "horrible" but said Big Blue would tough it out as "a positive force" for change.

MicroProse, in its endless quest for verisimilitude, plans an update of *F-15 Strike Eagle* that will bring the scenario closer to last spring's bombing of land-based targets in Tripoli and Benghazi (within the limits of good taste, of course; reliable reports indicate Khadafi's tent will not be a target).
–Jason Durbin

Barbara Clavan is a freelance writer and editor in San Francisco; Jason Durbin writes on technology from Berkeley, California; John Eckhouse is a business reporter for the San Francisco Chronicle; *and Wes Nihei is* PC World's *Editorial Assistant.*

Life Imitates Software

You're sitting quietly in the squadron's wardroom on board an aircraft carrier in the Gulf of Sidra, brushing up on Clausewitz. Suddenly, a siren sounds a priority one scramble. You hustle into your F-15 and blast off in search of tents, tractors, and uniform stores–typical haunts of Libyan strongman Moammar Khadafi. Scanning the ocean below, you're appalled to see wave after wave of heavily armed motorboats flinging themselves at the fleet. The Libyans are so furious, they bomb themselves. You drop your payload on a couscous factory and return to base.

You awaken to discover yourself slumped in front of the PC after an intense game of *F-15 Strike Eagle,* a *Jet* clone from MicroProse Software. One of the game's seven battle scenarios is frighteningly similar to the beginning of the April 1986 "tent-flap war," during which the the U.S. Sixth Fleet sailed into Libya's disputed territorial waters . . . with predictable results.

According to a MicroProse spokesperson, the scenario recreates an August 1981 confrontation between Libya and the United States, in which navy aircraft downed two Libyan fighters. The company's founder, Major "Wild Bill" Stears, is an ex-air-force pilot and civilian advisor to the Joint Chiefs of Staff. Stears, the company advises, is loath to call his programs games; he prefers to think of them as "real-life simulations."

F-15 Strike Eagle
MicroProse Simulation Software
120 Lakefront Dr.
Hunt Valley, MD 21030
301/667-1151
List price: $34.95
Requirements: 128K, one disk drive, color graphics adapter, joystick recommended

PC Life
Microstar Graphics, Ltd.
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List price: $7.95 per issue, $29.95 per year
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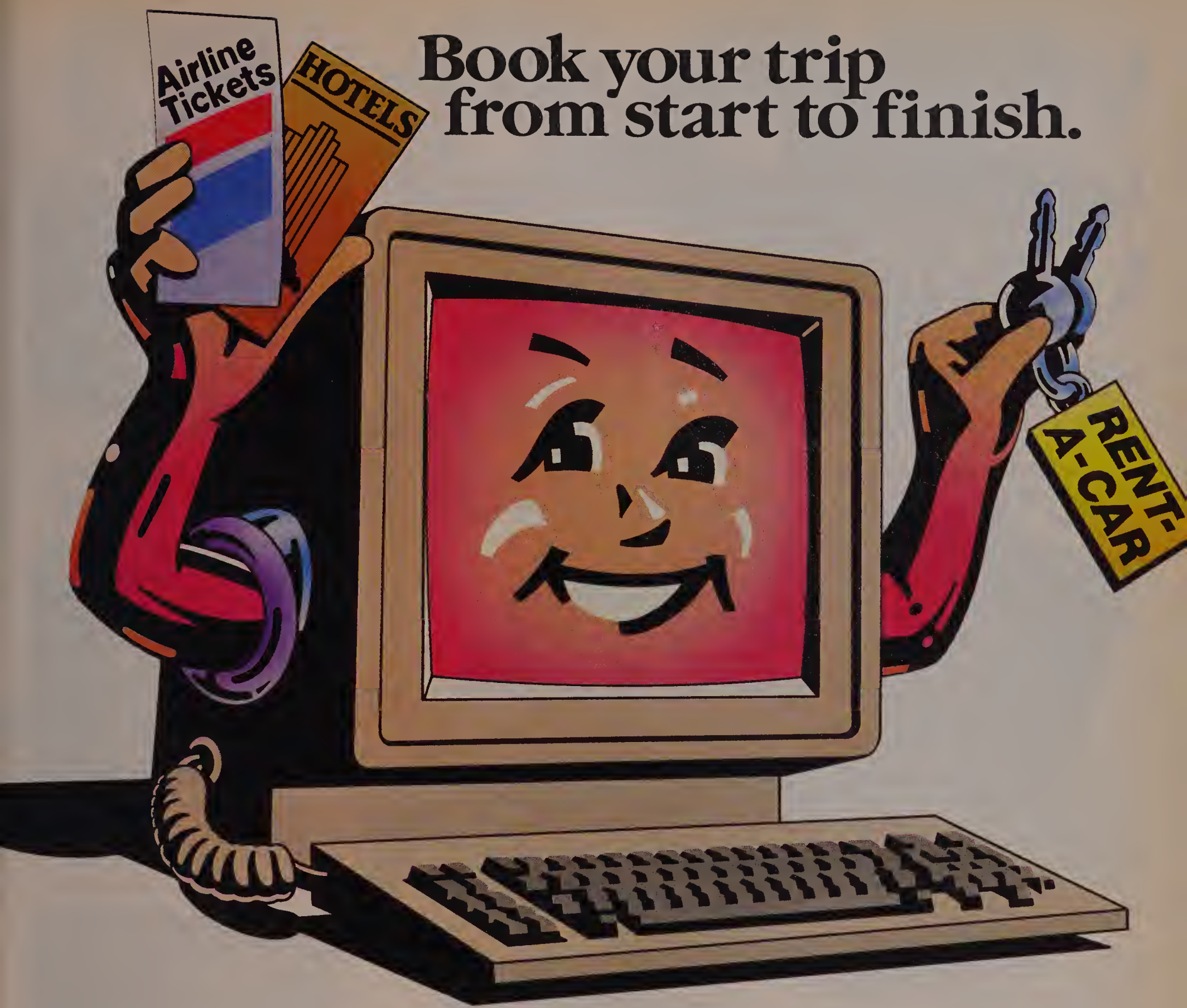

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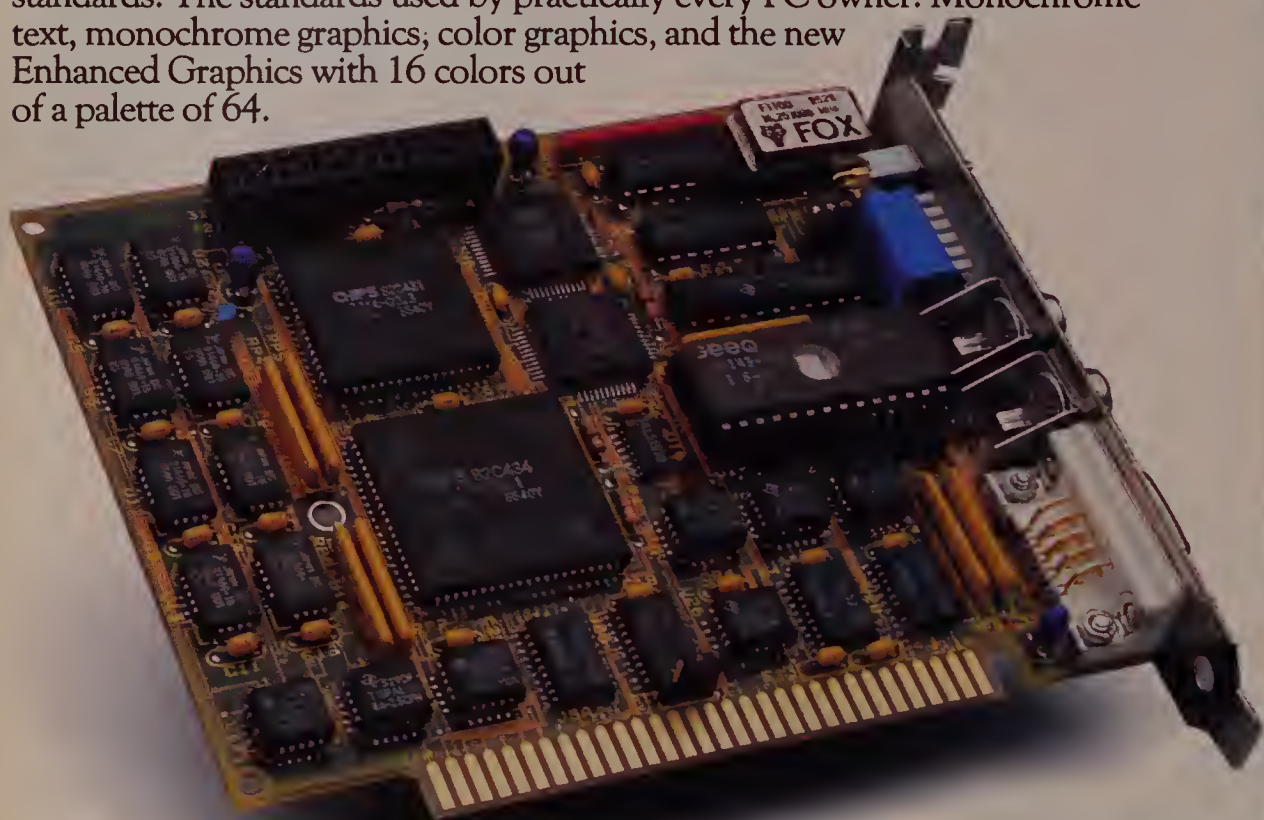

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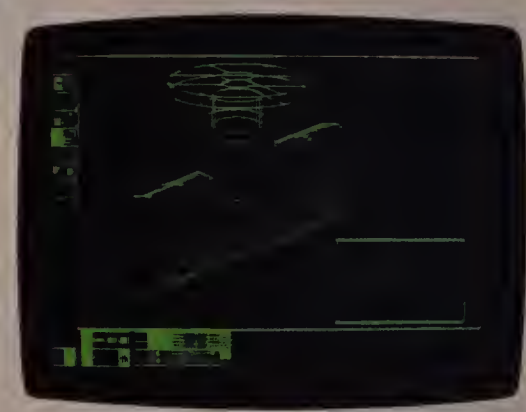

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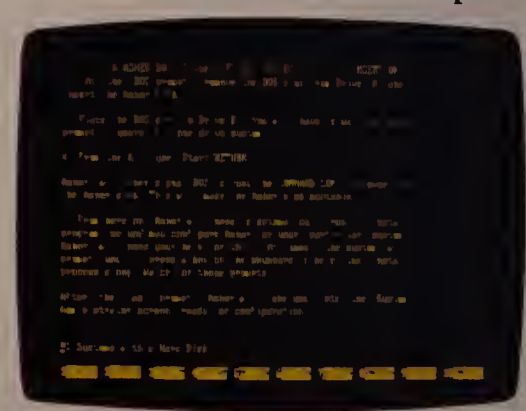

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From the Hardware Shelf

PC World offers first impressions of recent hardware releases

Will Data General's laptop triumph over the PC Convertible? Can a board help determine returns on PC investments? And just how much functionality can you cram in an expansion slot—or a printer?

Edited by Eric Knorr

Data General/One Model 2

When the Data General/One appeared on the scene almost two years ago, it was quickly recognized as a breakthrough in laptop computer technology. Although preceded by miniature miracles from Hewlett-Packard and Grid, the DG/One was the first affordable laptop with dual 3½-inch disk drives, a full-screen, 25-line-by-80-column display, and almost total PC compatibility.

But preeminence never lasts. The competition finally outdid the DG/One with lower prices, crisper displays, built-in hard disks, and other technological marvels. Now, in response to intensified rivalry among laptop manufacturers, Data General has reestablished itself with two new versions of the DG/One: the Model 2 LCD and the Model 2 EL.

At $1995, the Model 2 LCD costs $1500 less than the original DG/One and flaunts an enhanced black-on-green liquid crystal display. The display is far superior to the previous version and more readable than any other non-backlit LCD on the market. And for $1000 more, the Model 2 EL incorporates an excellent, CRT-quality electroluminescent display that glows in the dark. A built-in 10MB hard disk is available for either version for an additional $1000.

The Model 2 looks much the same as the old laptop. The ample 8½-by-6¾-inch screen size remains the same, and the keyboard has only been modified slightly. The chassis has grown about an inch longer and taller (to 14½ by 11⅘ by 3 inches), and the DG/One has put on a little weight—the dual drive LCD version weighs 11 pounds, or 12 pounds with a hard disk. (An electroluminescent screen adds an extra pound.)

Both Model 2 versions are controlled by an 80C88 microprocessor running at 4MHz, slightly slower than the IBM PC Convertible. A clock/calendar, an 8087 coprocessor socket, and a serial

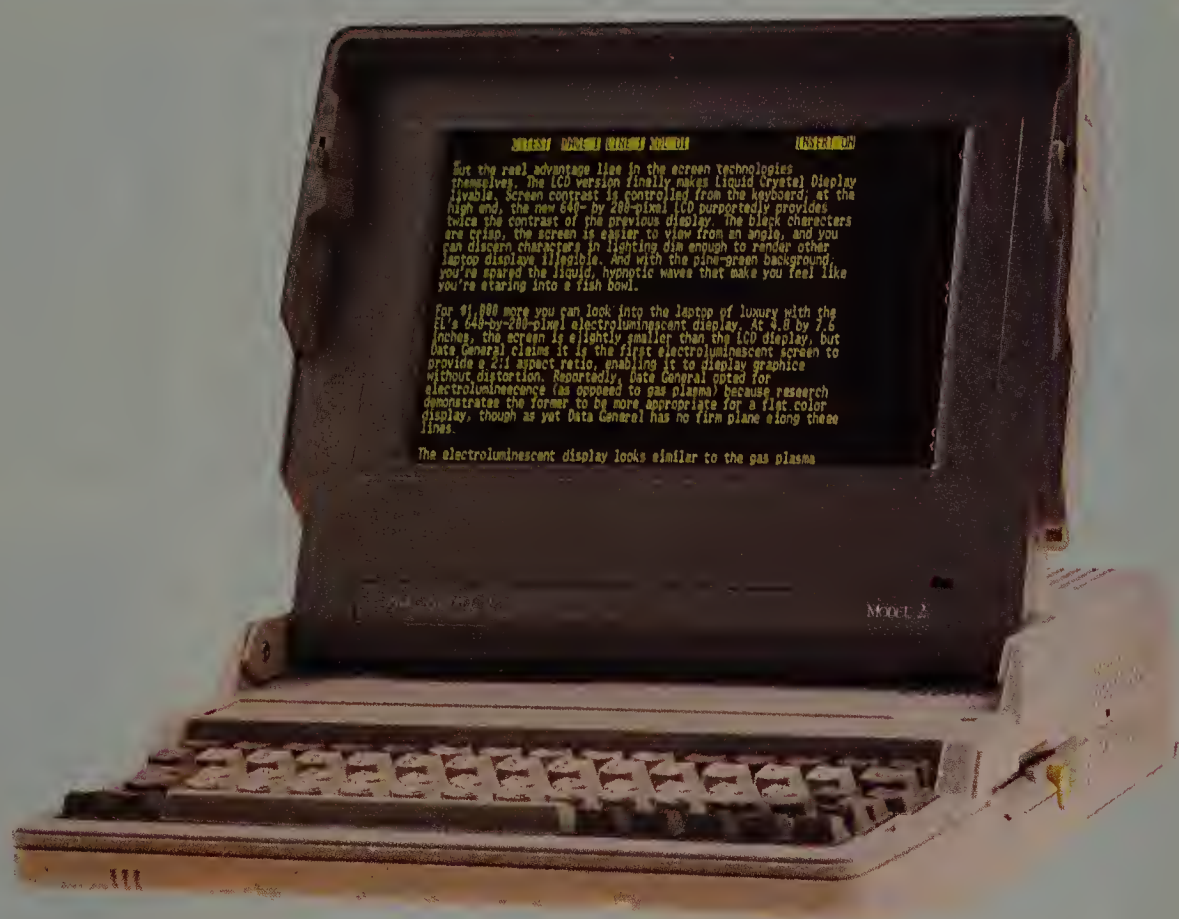
The Data General/One Model 2 LCD comes standard with two 720K 3½-inch disk drives, and offers as options the RGB port and external disk drive connector shown here.

Photographs by Fred Stimson

and parallel port are built in, and the machine comes with 256K RAM, expandable to 640K. (To expand the memory to 512K, you slide a 256K memory module into an easily accessible socket.) By contrast, the DG/One Model 1 and the PC Convertible can only address 512K (for a review of the Convertible, see "IBM's Road Machine" in this issue). Two 4-by-4-inch expansion slots are ready for a variety of Data General boards, including an additional serial I/O board, an adapter for an external RGB or composite monitor, and a controller for an optional 5¼-inch external disk drive. Raising the RAM to 640K requires an additional 128K memory expansion board, forcing you to sacrifice one of the two available general-purpose expansion slots.

During testing, the Model 2 worked well with a wide selection of software currently available on 3½-inch disks, including some programs designed for the IBM PC Convertible. *WordStar, WordPerfect, SideKick, 1-2-3,* and *SuperCalc 3* were test-driven without a snag.

The LCD version's built-in nickel-cadmium battery lasts 2 to 7 hours, down from the maximum of 10 hours afforded by the DG/One Model 1. To fire its display without AC power, the EL version needs an optional external battery, which lasts 2 to 3 hours. Both versions come with an external plug-in AC adapter, which also powers the battery charger, now built into the system unit. Unfortunately, the Model 2, like the Model 1, fails to monitor battery depreciation: All



The Data General/One Model 2 LCD (top) has one of the most readable displays of its kind, and the Model 2 EL's glow-in-the-dark screen finally puts CRT quality in a laptop. Both these small wonders have a 4MHz 80C88 microprocessor, 256K RAM (expandable to 640K), and offer a 10MB internal hard disk as an option.

(continues)

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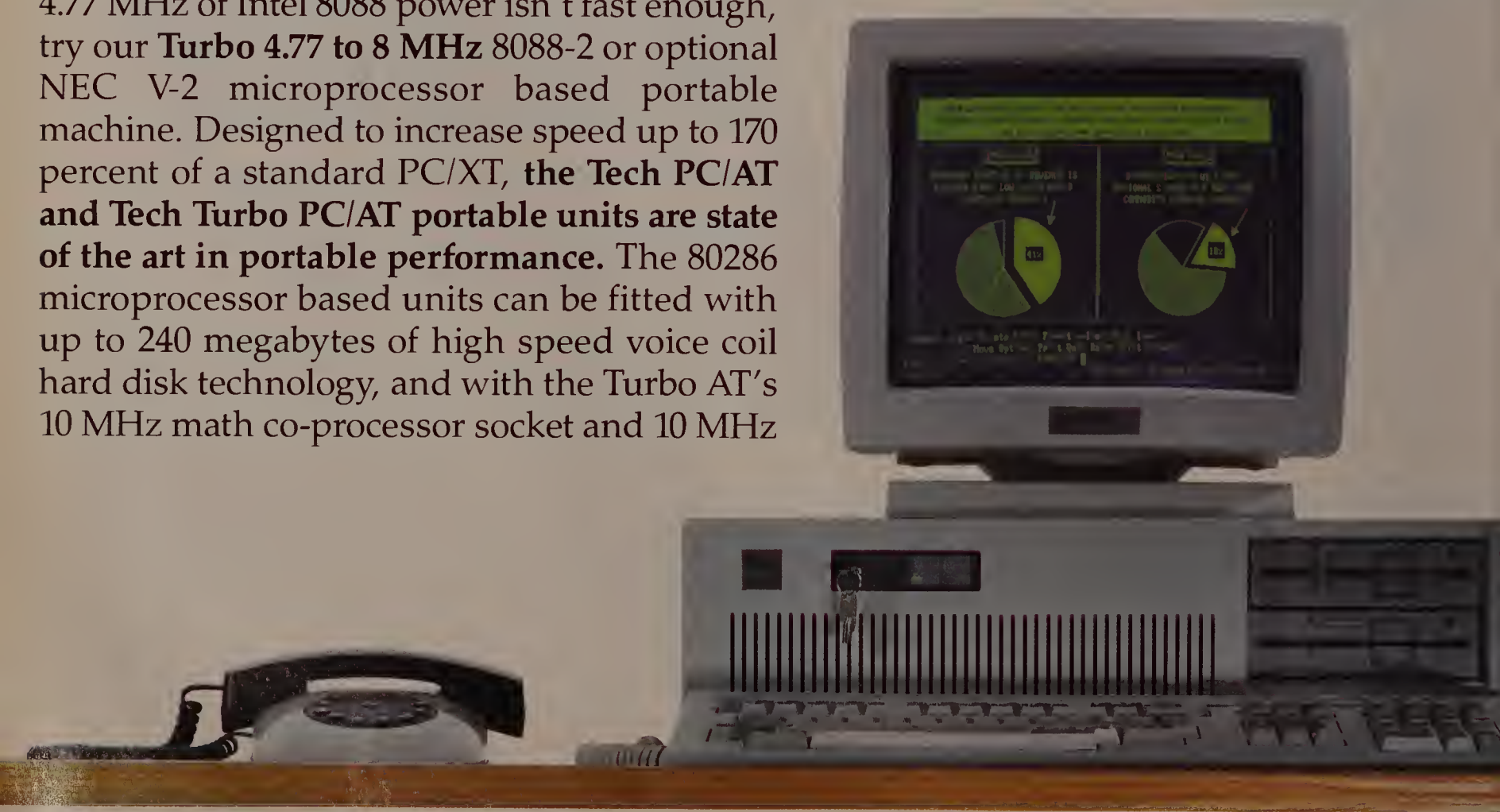

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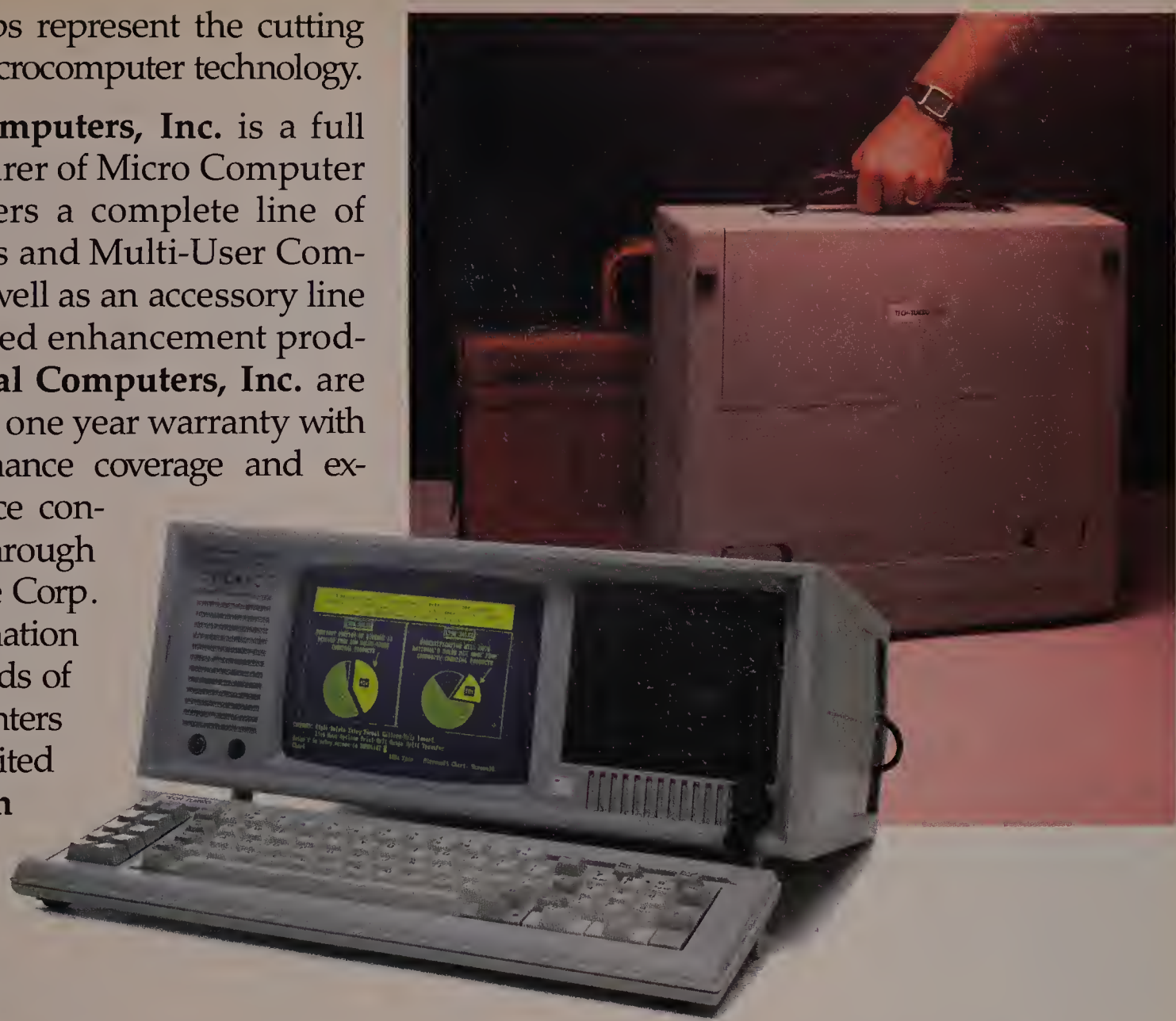

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you get is a brief screen message as the battery nears its last half hour of life.

The shock-mounted hard disk clicked like a flamenco dancer but performed admirably, even during rambunctious trips to New Orleans and Lake Tahoe. After lugging a Compaq Plus on innumerable junkets, the novelty of traveling with a featherweight hard disk was a real relief. However, you can expect a significant decrease in battery life when you swap floppy drive B: for a hard disk. And if you want to use the optional external 5¼-inch floppy drive, you'll need an AC power source.

If you can't spring for the $799 5¼-inch drive and its controller, you can import data and software via several modem options. Using an optional hardware/software package called PC Liaison, you can establish a direct connection with a PC. PC Liaison includes software for both computers and a 5-foot null modem cable that hooks up to the Model 2's RS-232C/RS-422 serial port. If that's not enough, you can buy a built-in 1200/300-bps modem for $450.

The Model 2's keyboard feels as sure and even as the earlier version (although it's not quite as crisp as the PC Convertible's). Most of its 79 keys are small and closely spaced, but I quickly felt comfortable with the keyboard. Data General has made only minor changes to the layout: The top part of the original's L-shaped <Enter> key has been replaced with the backslash key, and <GrayPlus> and

(continues)

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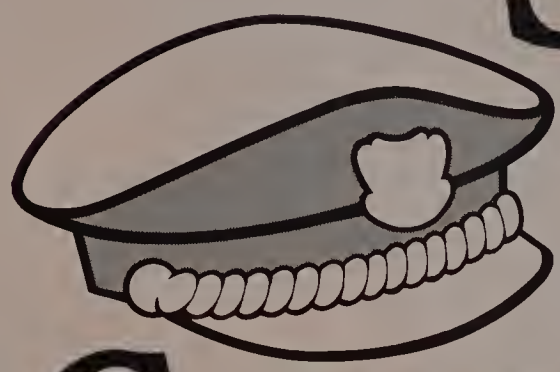

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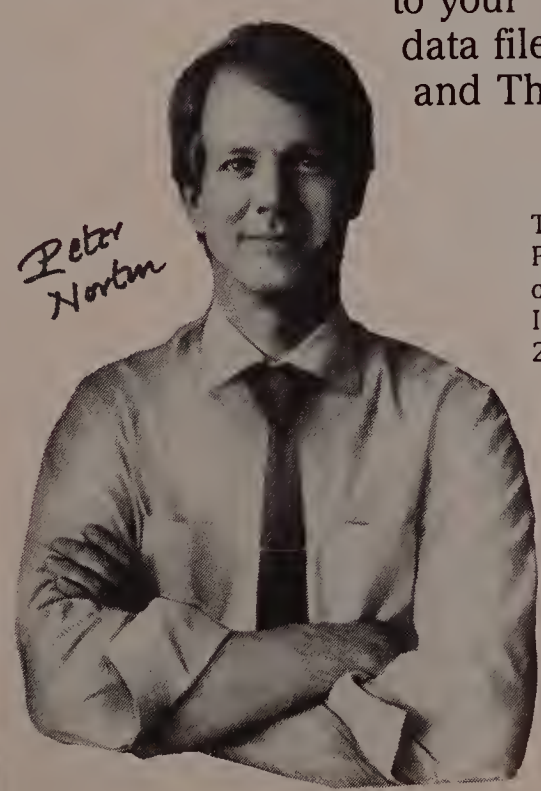

The Norton Commander. Designed for the IBM® PC, PC-AT, and DOS compatibles. At your software dealer or order direct for $75 from Peter Norton Computing, Inc., 2210 Wilshire Boulevard, Santa Monica, CA 90403. 213-453-2361. Visa and Mastercard welcome.

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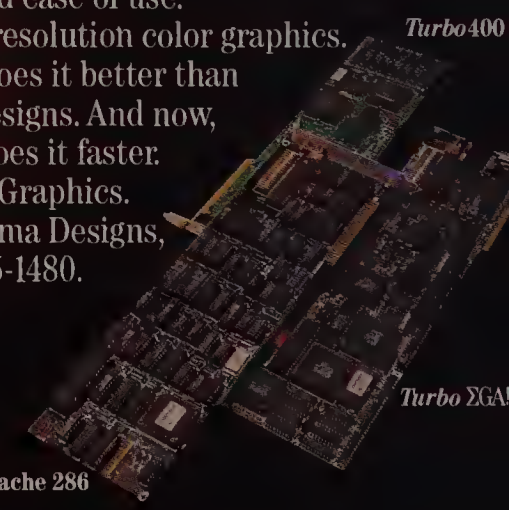

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<GrayMinus> keys have been added to the right of <Enter>. Pressing <Spcl> (special) in conjunction with the cursor keys now accesses the <PgUp>, <PgDn>, <Home>, and <End> commands. Unfortunately, the cursor keys still sit inconveniently in a straight row on the lower right of the keyboard.

Pressing <NumLock> gives you access to the embedded numeric keyboard, which has red numerals to distinguish it from the ordinary letter keys. When you press <Ctrl>-<Alt>-<Cmd>, you get ROM-based diagnostics and a configuration program, plus two communications programs: a simple TTY affair and a terminal emulator for the Data General Dasher terminal.

The Model 2's display is its most notable improvement over the Model 1. For starters, both the LCD and EL screens can be folded back 180 degrees to a horizontal position, a feature that gives you total flexibility when adjusting to lighting conditions. This maneuverability is augmented by the back panel cover, which you can pull down to act as a rear foot.

But the real advantage lies in the screen technologies themselves. The LCD version finally makes liquid crystal display tolerable. Screen contrast is controlled from the keyboard; at the highest contrast setting, the new 640-by-200-pixel LCD purportedly provides twice the contrast of the Model 1 display. The black characters are crisp, the screen is easier to view from an angle, and you can discern characters in dim

(continues)

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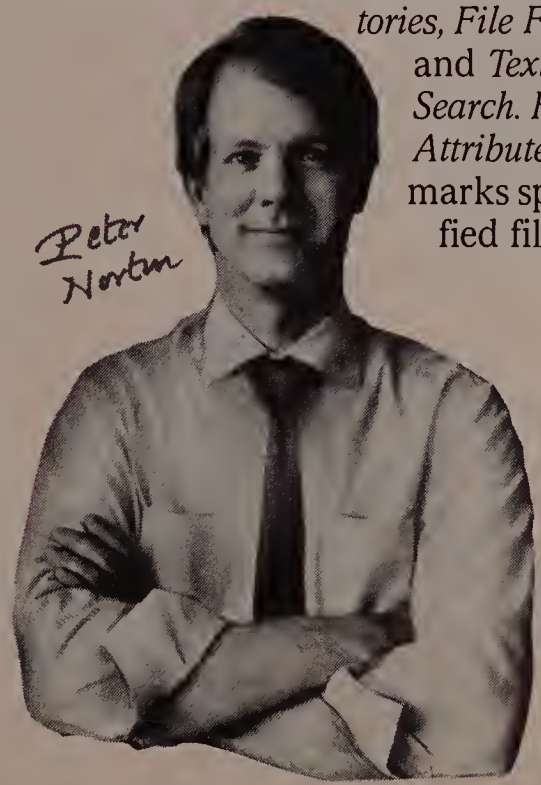

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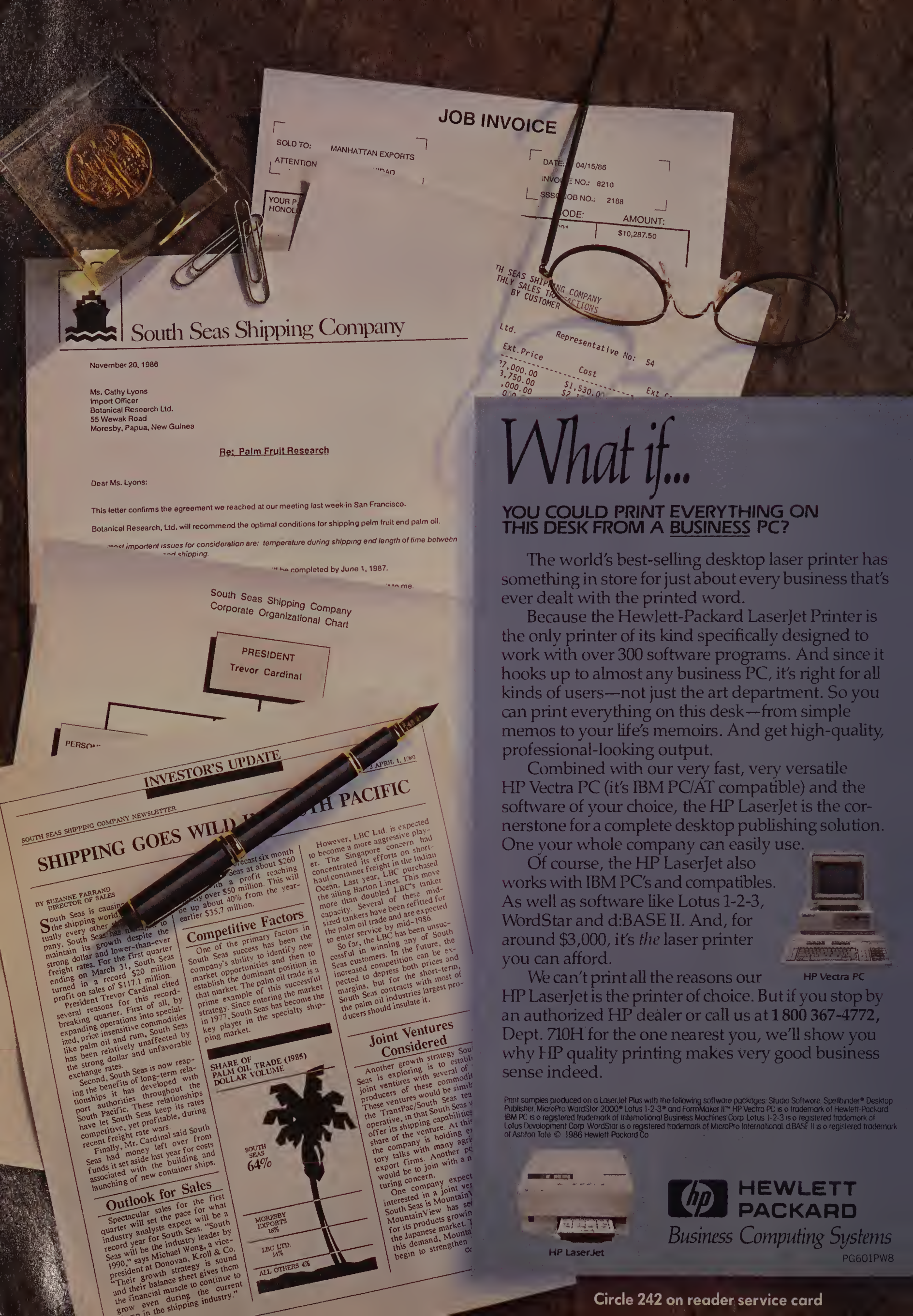

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lighting that would render other laptop displays illegible. Fortunately, you're also spared the liquid, hypnotic waves that make you feel like you're staring into a fish tank.

For $1000 more you can look into the laptop of luxury with the EL's 640-by-200-pixel electroluminescent display. At 4⅘ by 7⅗ inches, the screen is slightly smaller than the LCD, but Data General claims that it is the first electroluminescent screen to provide a 2:1 aspect ratio, which enables it to display graphics with minimal distortion. Reportedly, Data General opted for electroluminescence instead of gas plasma because research indicated the former was more appropriate for a flat color display. (As yet, Data General has no firm plans to develop a color display for the EL.)

The electroluminescent display resembles the gas plasma screens of Grid and Toshiba laptops, but it's lighter, thinner, and uses less power. In gas plasma displays the screen is like a neon tube: Electrical charges illuminate little pockets of gas that serve as pixels. In electroluminescent technology, the charges stimulate a thin layer of film insulators and electrodes, causing phosphors in the film to glow.

The EL's light-emitting, bit-mapped screen is easy on the eyes, even in the dark. The screen refresh is fast, and ghosting is limited, although it's easy to permanently burn characters into the screen if you leave one image on for too long. Marathon sessions

(continues)

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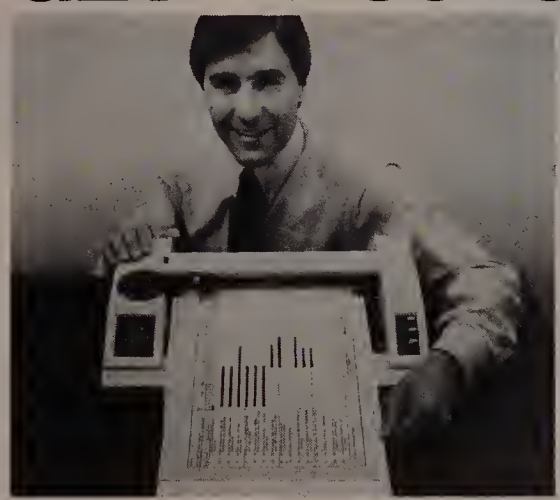

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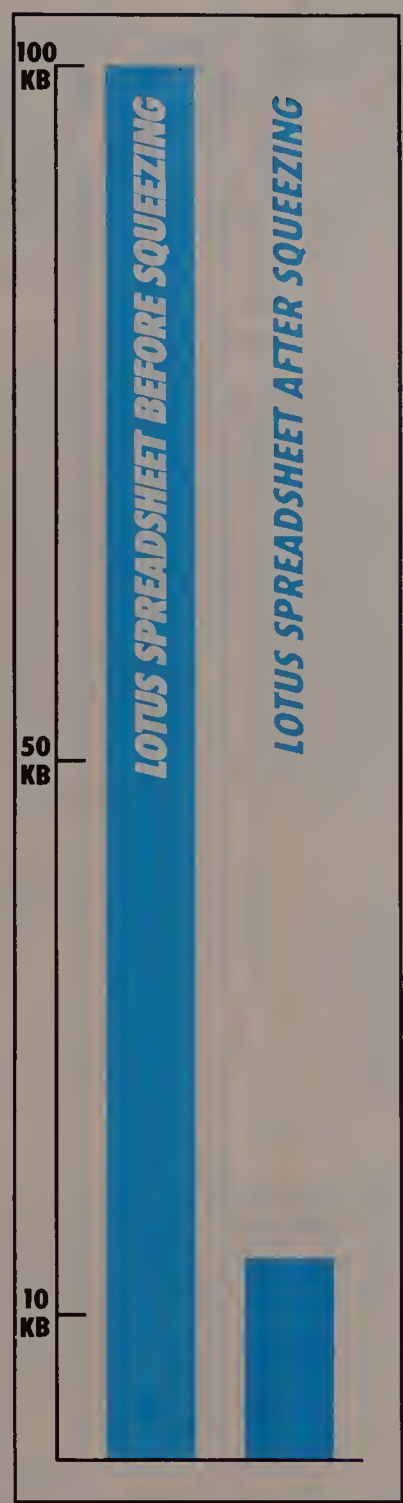

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with *WordStar* burned the status line into my screen; it appears as a permanent ghost no matter what program I'm using. You'll definitely want to use the screen-blanking program, which is loaded via the EL's AUTOEXEC.BAT file at start-up.

Data General also sells a 4-pound thermal printer that knocks out 20 characters per second (cps) in letter quality mode and 40 cps in draft. You can use heat-sensitive paper or install a ribbon and use regular paper. Connected via the DG/One's serial port, the printer is powered by its own battery or by the AC adapter.

The conflicting considerations of battery life and screen clarity continue to hamper the development of the perfect laptop computer. Yet diverse applications weight those factors differently. For users in sales, engineering, and scientific research, long battery life is all-important; businesspeople, on the other hand, seldom require more than 3 to 5 hours without AC—enough time for a cross-country flight. Not only do the Model 2 versions give you a choice between electroluminescent dazzle and low LCD power drain, the EL's battery pack supplies a respectable 3-hour lifespan, and the LCD gives you high-contrast readability. Combine this with hard disk storage and PC compatibility, and what more could you ask for? Well . . . how about a 20MB hard disk, tape backup, an 80286 running at 10MHz, a 2400-bps modem, a color screen . . . —*Eric Brown*

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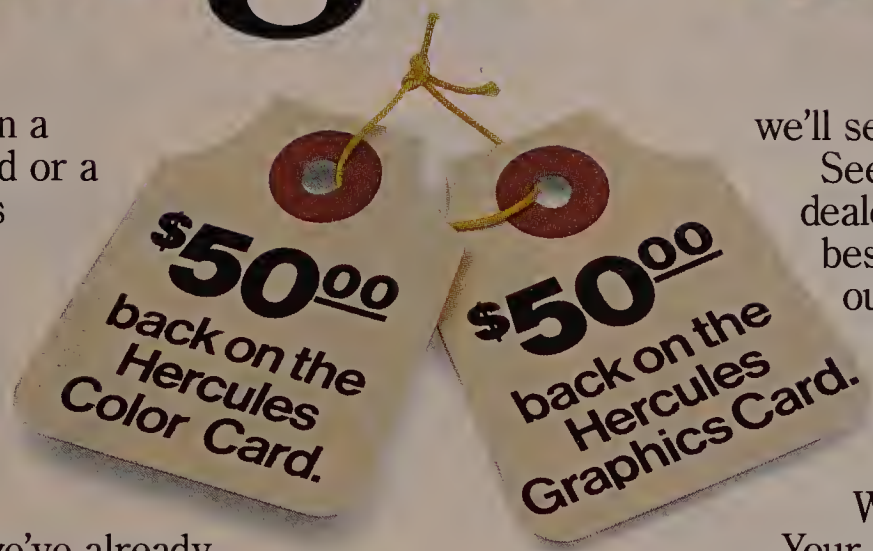

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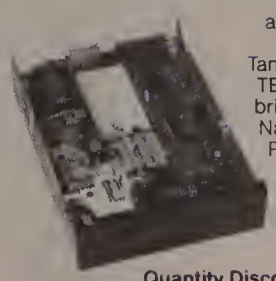

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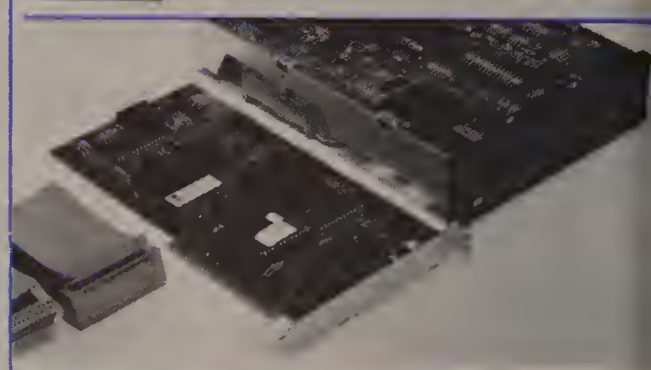

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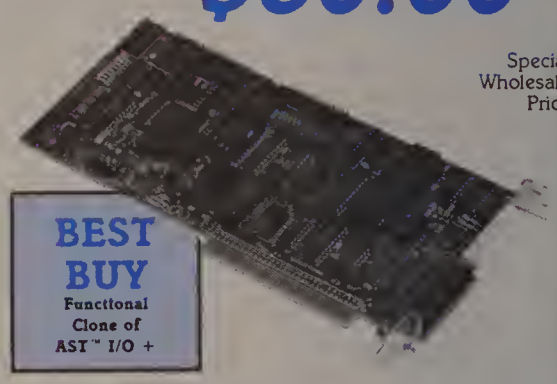

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Each transaction record lists the user's name, the account name, the date, the time work on the account began, the time it ended, and total elapsed time. Only "system managers" supplied with the correct password can access this audit trail, which appears on screen as a chronological list or can be written to a disk text file with the command Read Trail >*filename*.

The fun comes when you manipulate the audit trail using the board's software filters, which rearrange the order and appearance of usage data recorded. For example, the filters Ampm and Nosec will convert 14:06:06 to 2:06pm. Dconv will change 1986/03/25 to 25-Mar-86. Two other filters, Reduce and Summary, will tidy up the report by eliminating repetitions and consolidating data. These filters can be combined with DOS filters, such as Sort and More.

At first blush the commands are somewhat daunting. For example,

(continues)

```
JEANNINE    MISC        14-Mar-86 11:59a    2:13

JORDAN      CALLAWYER   19-Mar-86  2:56p    1:02

            MISC        14-Mar-86  2:57p    0:13
                        16-Mar-86  4:27p    1:30

            PCWORLD     14-Mar-86 11:26a    0:23
                                   3:28p    1:50
```

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San Diego, CA 92109
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to read the trail in a suitable format, I used the sequence Read Trail Name Account Start Length ¦Sort ¦Ampm ¦Dconv ¦Reduce ¦Nosec ¦Nocol 5 ¦More. Menacing, yes, but I put the commands into a batch file named TRAIL.BAT, and now I just type *trail*. The resulting report is shown in Listing 1.

Obviously, an attorney or CPA would find data in this format useful when billing clients for PC time. According to Bay Computer, however, PC/Audit is most often used to manage in-house computer resources. The board's software also exports data in forms readable by *1-2-3* and *dBASE III*, inviting data analysis by administrators who wish to determine when additional PCs are required and how to better use existing equipment.

Of course, the PC/Audit Card's monitoring and gatekeeping capabilities aren't foolproof—you can always open the machine and pull out the card. The board also forgoes electronic sweatshop tactics such as counting keystrokes. But for those users who want to establish basic controls for their PCs, the PC/Audit Card's reporting and password protection capabilities are a good place to start. *—Jordan Breslow*

PC/Audit Card
Bay Computer Corp.
York and Haverhill Sts.
Andover, MA 01810
617/470-3748
List price: $239

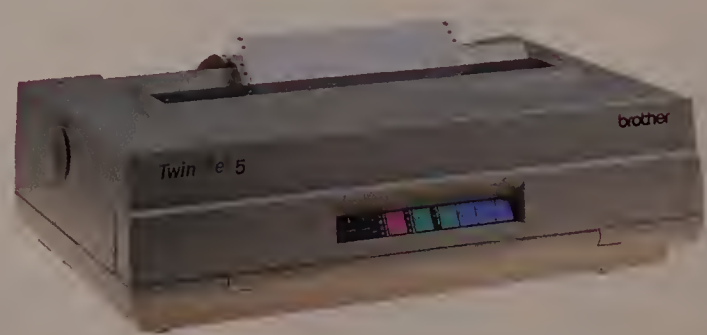
Twinriter 5

Brother's Twinriter 5 supplies what everyone always wanted, but never got, from a printer: graphics and letter quality text. No, the output isn't just *near* letter quality, and no, the Twinriter is certainly not a pricey laser printer. Inside this clever machine, a 9-pin dot matrix head snuggles up to a 96-character daisy wheel on a single 15-inch-wide carriage.

The marriage of dot matrix and daisy wheel in one machine was a natural match for Brother, which is a major player in both technologies.

To offer broad compatibility, either printing element can emulate that of a Diablo or Epson printer. Better yet, it can automatically combine its two modes to produce

(continues)



Offering 140-cps draft mode and 36-cps letter quality mode, Brother's Twinriter 5 packs separate daisy wheel and dot matrix printheads in one reasonably priced machine.

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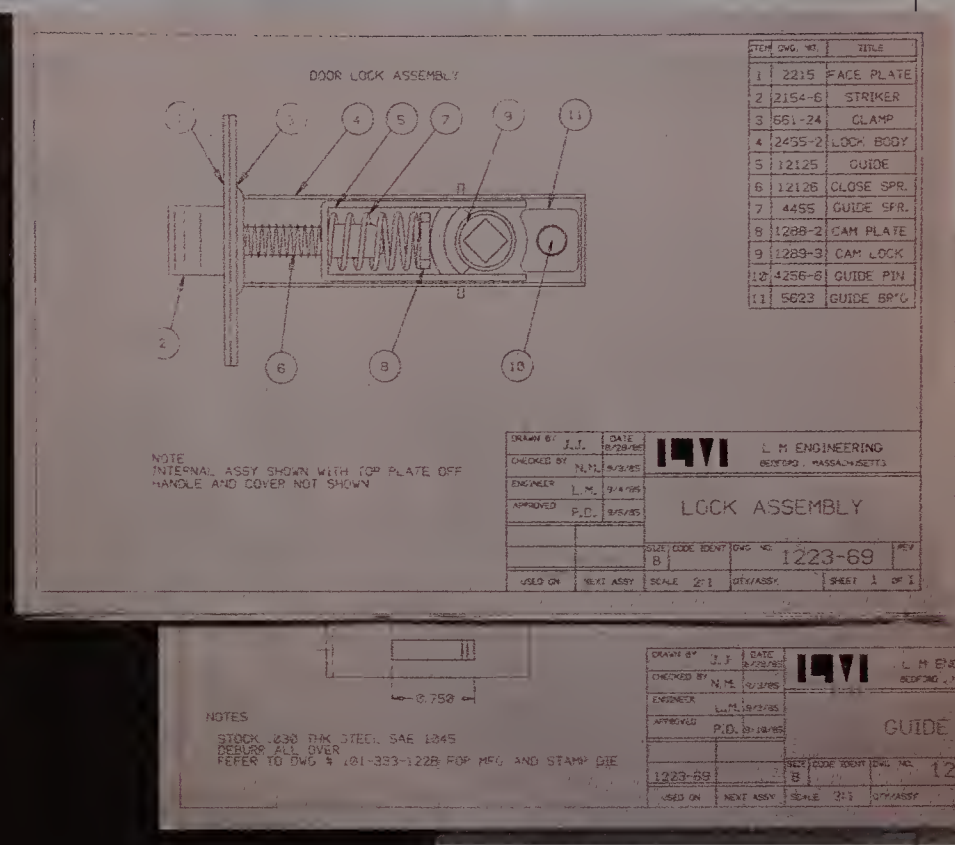

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Circle 677 on reader service card

both letter quality text and graphics on a single page, or in a single line. The daisy wheel's 36-characters-per-second (cps) speed is pretty pokey, but in draft mode the Twinriter spits out legible dot matrix text at a reasonable 140 cps. You can select printing modes either from the switches on the front panel or from DIP switches mounted at the rear. Six different dot densities are offered, including a 24-by-24-dot character box for near letter quality text.

The ease of switching between draft mode and daisy wheel would make the Twinriter a valuable addition to any PC user's desk top. But what really makes it shine is its ability to combine graphics and letter quality text on the same page without cable switching or resetting DIP switches. Being able to position a chart or graph in the middle of a page of letter quality text, or to wrap that text around a graphic, gives the Twinriter something close to low-end desktop publishing status, especially with more than 180 daisy wheel fonts available (the machine comes with 3).

The problem with integrating text and graphics rests with the existing software, not with the printer. Integrated programs like *Framework* and *Enable* make the task simple. But putting a chart or graph from *1-2-3* into a word processing document can be close to impossible without a utility program like *Inset*, which is designed specifically for such integration. *1-2-3* files, incidentally, require a special macro that enables the printer to switch back and forth between the daisy wheel and dot matrix printheads.

The Twinriter's standard frictionfeed mechanism can be augmented with an optional single-bin sheet feeder ($325) or a bidirectional tractor feeder ($165). This fall, Brother expects to ship a

(continues)

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REPORT BUILDER CYCLE:

Key in the report parameters on screen

Print your listings
- New report format for reference
- Report element layout

Press a key, wait 6 secs*

Key in the report data elements on screen

Report Builder automatically writes the program code and links it to your datafile

Print your listing
- Report program source code listings

Compile the report builder code using the Turbo Pascal™ compiler

Attach the new report module to your system menu

SYSTEM BUILDER CYCLE:

Paint the menu screens

Paint the application screens

Define the datafile(s) on the screen

Press a key, wait 6 secs*

System Builder automatically writes the program code and combines the datafiles into a relational database

Print your listings
- Program source code listing
- Datafile layouts
- Self-documenting program (includes screen schematics)

Compile the System Builder code using Turbo Pascal™ compiler

Start using the completed system

*System Builder will generate 2,000 lines of program code in approximately 6 seconds.

REPORT BUILDER FEATURES:

- Automatically generates Indented, Structured Source Code ready for compiling Turbo Pascal (no programming needed)
- Automatically interfaces to a maximum of 16 Datafiles created with System Builder
- Supports Global Parameters such as Headings, Footers, Lines Per Page, Print Size and Ad Hoc Sorting
- Produces reports containing an unlimited number of Sub-Headings, Sub-Totals and Totals
- Page breaks on Sub-Totals
- Report Builder will generate Report Programs which can contain Report Elements not just restricted to Data Elements. Reports can also include Text Strings, Variables or Computed expressions containing references from up to 16 Datafiles
- Use range input screens produced by System Builder to allow End Users to select portions of a report as needed (i.e. specific account ranges can be requested)
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- Easy-to-use Interface Program to access dBase Files

SYSTEM BUILDER PERFORMANCE

(Typical 10 screen 8 file/index application)

TASK	SYSTEM BUILDER	DBASE III™
Planning and Design	60 minutes	60 minutes
Screen Painting	15 minutes	3 hours
Programming	2 minutes	10 hours
Elapsed time to completed system	**1 hour and 17 minutes**	**14 hours**

SYSTEM BUILDER FEATURES:

- Automatically generates Indented, Structured, Copy Book Source Code ready for compiling with Turbo Pascal (no programming needed)
- Paint Application and Menu screens using Keyboard or Microsoft Mouse™
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System Requirements—System Builder/Report Builder: IBM PC/XT/AT[1], or similar, with minimum 256K RAM, dual floppy drives, or hard disk, color or monochrome monitor, MS[2] or PC DOS[1] version 2.0 or later, Turbo Pascal Version 2.0 or later (Normal, BCD or 8087 versions).

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ROYAL AMERICAN *Technologies Corporation*™

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triple-bin feeder in which one bin is used specifically for envelopes.

Were you to split it in half, the $1295 Twinriter 5 would be either an expensive dot matrix printer—given its low speed and print quality—or an expensive and slow daisy wheel. But compared to the laser option, it has to be considered a cheap way out of at least one of life's nagging choices. *—Jon Stewart*

Twinriter 5
Brother International Corp.
8 Corporate Pl.
Piscataway, NJ 08854
201/981-0300
List price: $1295

OnBoard

Splendid, I whispered, as 20MB of hard disk storage on a board passed into my hands. Now I'll have souped-up performance from all my programs, without sacrificing a floppy drive or fussing with DIP switches. Technology has finally supplied me with that elusive blend of power and convenience in the form of Maynard's OnBoard hard disk.

As I eased the Maynard into my Compaq Portable, my enthusiasm paled. True, the board installed in my Compaq without a hitch, but its girth gobbled one-and-a-half of my precious slots. IBM PC and XT owners can relax a bit, however: In the number one slot, the board won't encroach on its neighbors, provided you evict the speaker from its home and move it to the slot holding the three-quarter-length floppy controller board. Should that slot contain a full-size board, Maynard will supply you with a speaker mounting kit free of charge.

After you plug in the OnBoard, you need to partition and format the hard disk—a two- or three-step process. Although the manual's

(continues)

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System Requirements: IBM (PCjr, PC, XT or AT)[1] or other compatibles. 128K RAM, 80 or 132 column printer, 80×24, monitor, MS-DOS[2], PC DOS[1] 2.0 or later.

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Circle 453 on reader service card

clear and concise descriptions keep the task from being too onerous, other hard disk card vendors offer installation utilities that perform these tasks with an elegantly simple *install C:*.

The OnBoard proved a hardy sort, withstanding several junkets in my VW convertible without a single disk error. The disk's rubber shock mounting explains its ruggedness (its 40g nonoperating shock rating is equal to that of the Compaq Plus's stock hard disk), but I was surprised to find that parking the OnBoard was a manual procedure. (Most hard disk cards automatically park themselves, greatly decreasing the likelihood of a head crash.)

The OnBoard's 60-millisecond average access time, combined with its standard interleave value of 2 (resulting in fewer spins to access successive sectors), promises better than average performance. I used *PC World*'s hard disk tests and compared the results with those of Mountain Computer's 20MB DriveCard (see "Card Tricks," *PCW*, June 1986). In the 100K-file read, write, and seek maneuvers, the OnBoard ran almost dead even with the DriveCard; with 1024K files, the OnBoard came in just a nose ahead.

Other specs enhance the impression of this card as a capable yet unexceptional performer. Its one-year warranty and mean-time-between-failure (MTBF) rate of 15,000 hours are also equal to (or just below) the specs for most hard disk slotters. And although the OnBoard's appetite for watts is fairly high (18 at power up and 12 overall), it shouldn't overtax any but the oldest Compaq Portable power supplies.

A satisfactory entry, Maynard's board ably supplies all the traditional hard disk benefits, including self-booting, support for directories and paths, and relief from the swelling ocean of floppy disks. However, as with all hard disk cards, it's a good idea to consider

(continues)

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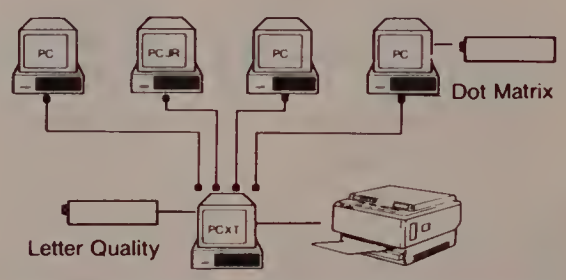

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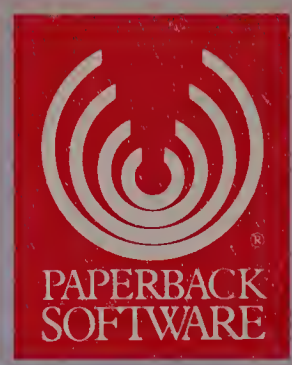

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Sort on indexed field	4:42	>60:00*	13:08	10:19	7:52
Count to 5000	4:10	9:04	9:43	11:35	18:51

(all times in minutes:seconds) *test terminated after one hour

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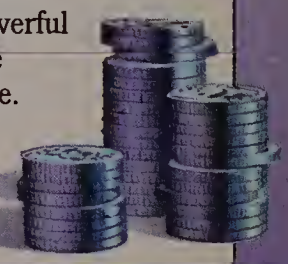

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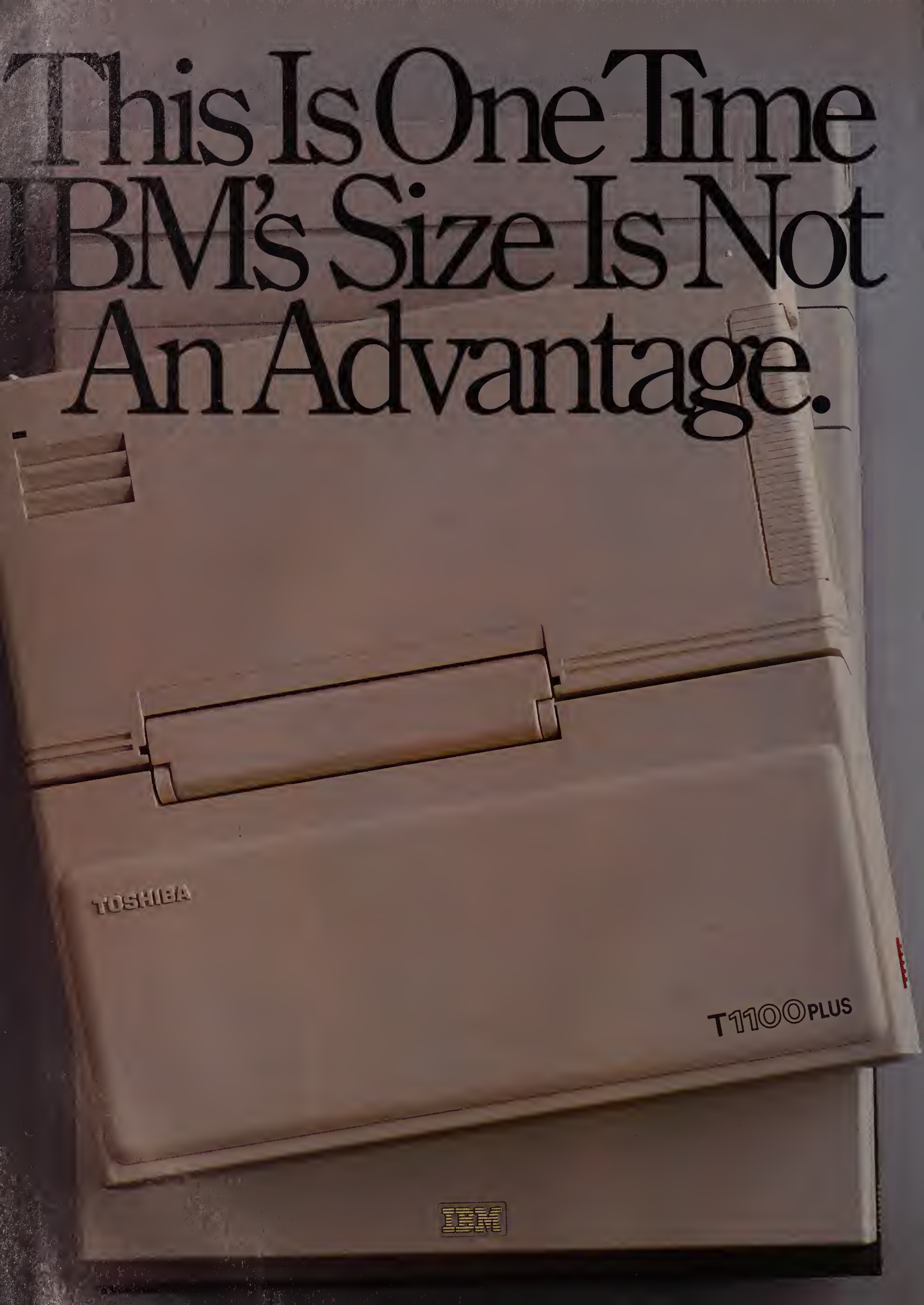
This Is One Time IBM's Size Is Not An Advantage.



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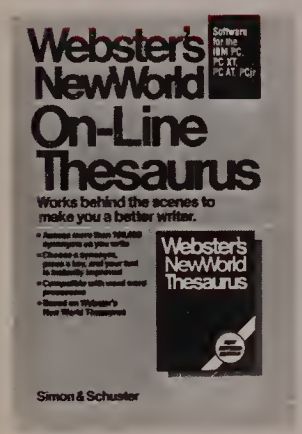

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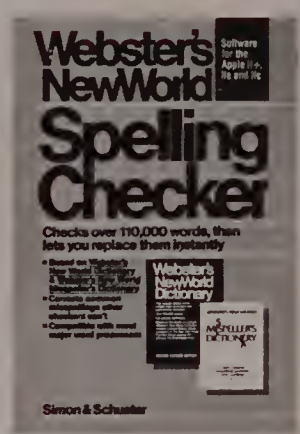

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Disk space required (full dictionary)	360K	160K	208K
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Undo synonym replacement	y	n	n
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the trade-offs between the On-Board and its bay-bound brethren. You'll be able to hang onto your second floppy drive, and you'll appreciate the reasonably simple installation, but in exchange, you should expect slower performance and greater heat buildup—not to mention paying a few hundred dollars more. *—Art Wilcox*

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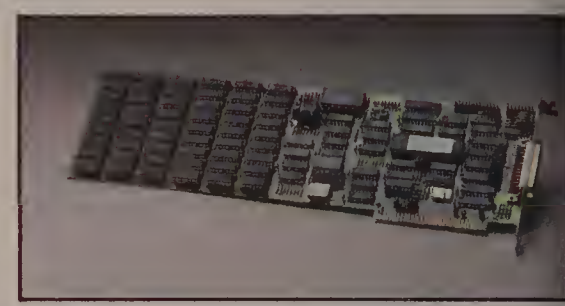

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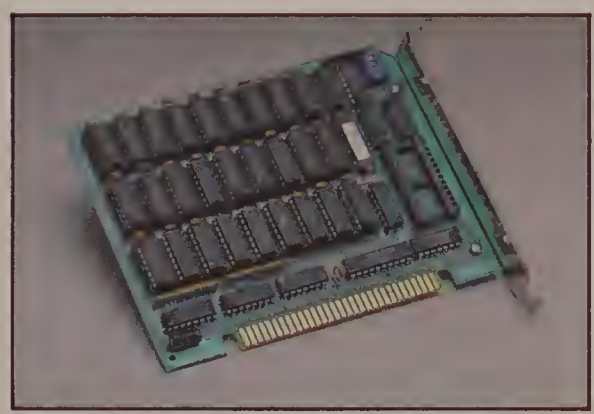

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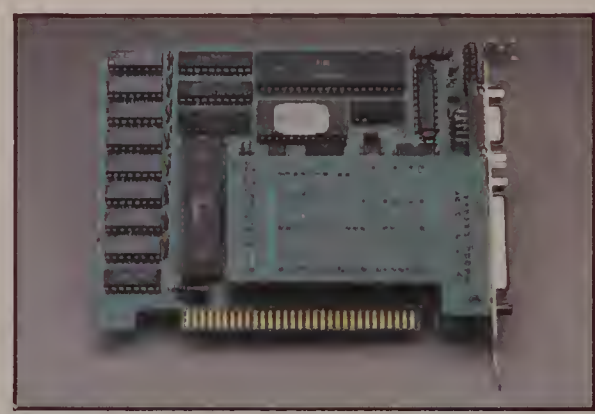

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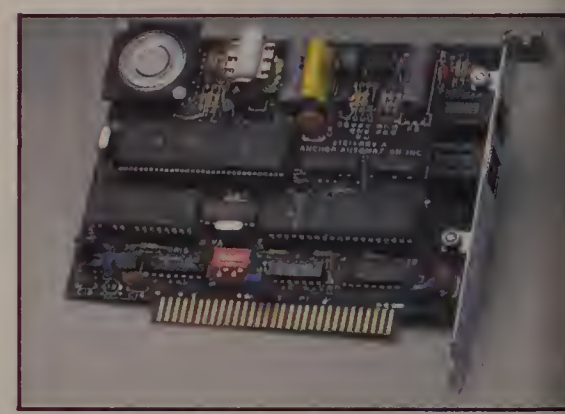

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Circle #400 on reader service card.

and lets you produce 4 colors simultaneously from a palette of 16 on an RGB or composite color monitor using your favorite graphics software.

In fact, CGA compatibility doesn't come any better. The CGA and the Color Combo Card are designed around the same CRT controller device, the Motorola 6845. Its two alphanumeric modes mirror the CGA's: you have a choice of the little-used 40 columns by 25 lines and the ever-popular 80 columns by 25 lines. The Color Combo's graphics also duplicate the CGA's medium resolution of 320 by 200 pixels, as well as the 640-by-200-pixel high-resolution mode in one color. You'll also notice that Color Combo graphics duplicate the CGA's, right down to the characteristic screen flicker you see while scrolling through a text file.

Besides adding color to the PC, the Color Combo Card in its 384K configuration quickly fills the PC's memory to the 640K limit. Bargain hunters who want to install their own chips may prefer the 64K version or select the color board with no extra memory at all.

Besides graphics and heftier memory, the space-conscious Color Combo Card packs in a serial port, a parallel port, a phono jack for composite video, a clock/calendar, and even a light-pen interface. The standard RAM disk, print spooler, and clock driver utilities come packaged with the board.

(continues)

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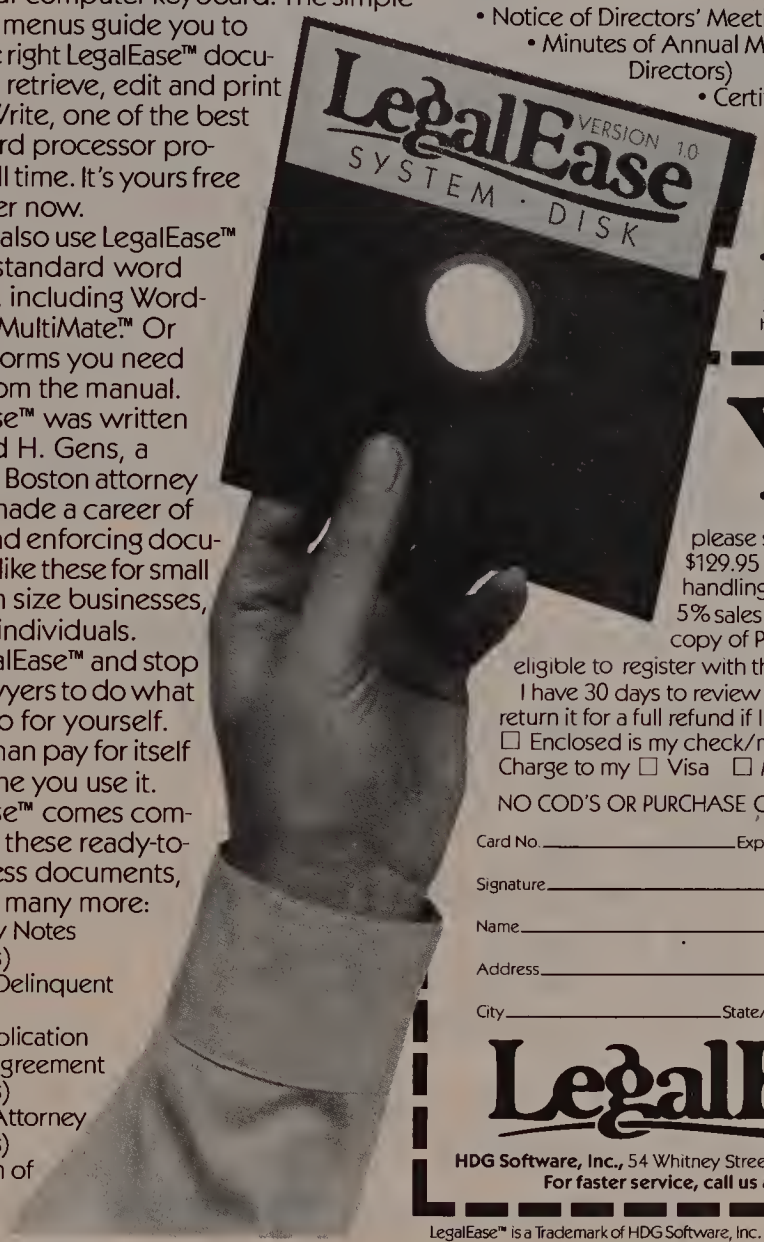

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The Color Combo Card memory expansion capabilities require an existing 256K of RAM on the motherboard. Installation is a simple task: If you can find an empty slot in the system unit and reset a few DIP switches, you're in business. Even for a novice, this should take no more than 10 minutes—a quick fix that should please a wide range of users.

These days, the venerable PC can use all the help it can get. For some applications, the Color Combo Card may be all the help it needs. —*Wes Nihei*

Persyst Color Combo Card
Persyst
3545 Harbor Blvd.
P.O. Box 6725
Costa Mesa, CA 92626
714/662-5600
List price: $395, with 64K RAM $435, with 384K RAM $580
Requirements: 256K

Eric Brown is an Associate Editor for PC World. *Jordan Breslow is a partner in the Walnut Creek, California, firm of Stewart, Stewart, and Breslow, which emphasizes computer law. Jon Stewart is Managing Editor of* PC World. *Art Wilcox is a Contributing Editor for* PC World. *Wes Nihei is the Editorial Assistant for* PC World.

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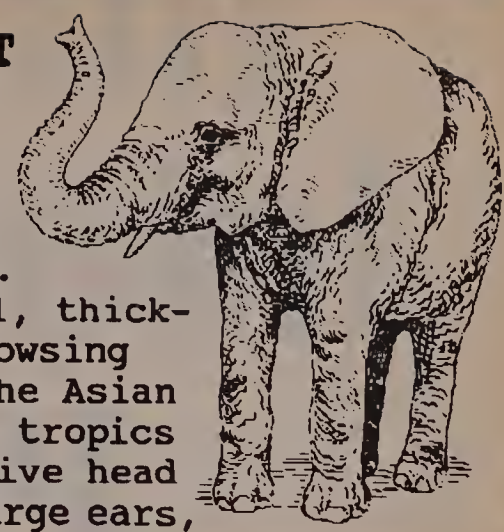

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ClickArt Personal Publisher brings page layout to the PC. The newsletter shown was printed using the Apple LaserWriter.

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Circle 252 on reader service ca

From the Software Shelf

PC World offers first impressions of recent software releases

A balanced template, a better better BASIC, ThinkTank on the run, Norton redux, and a calendar for forgetful legal eagles

Edited by Robert Luhn

Ledger Domain

Balancing my checking account every month is like taking my daily 2-mile jog: I know I'll be a better person for doing it, but it's boring and slightly painful. And so, like many among us, my checking account remains, well, unbalanced.

If you're a conscientious objector to checkbook reconciliation, *Ledger Domain* might change your mind. With this *1-2-3* template, you can balance your account when monthly statements arrive, sort entries, print out checks, and produce summary reports by expense category. The documentation is readable and logically structured, with a handholding tutorial and a detailed section on the program's more complex features. The template itself reflects this thoughtful design, its menu-driven interface paralleling the steps normally followed with a manual system. In short, *Ledger Domain* does nearly everything you should do with your checking account but don't.

As with most commercial templates, pressing <Alt> in combination with previously defined keys triggers some program actions. Writing and recording checks is surely one of the most tedious chores with a manual system. With *Ledger Domain,* pressing <Alt>-N shoots the cursor to the first empty cell in the check disbursement column of the worksheet. The template automatically inserts the proper check number and date; when you type in the recipient's name, the amount, and a previously defined account code, the check is automatically posted to the template's ledger. <Alt>-U recalculates the balance (see Screen 1).

For recurring, fixed expenses, such as loan payments and rent, you can save even more time by adding an automatic entry module to *Ledger Domain*'s main menu. If you've built *1-2-3* menus before, the process is straightforward; if you're not an intermediate Lotus

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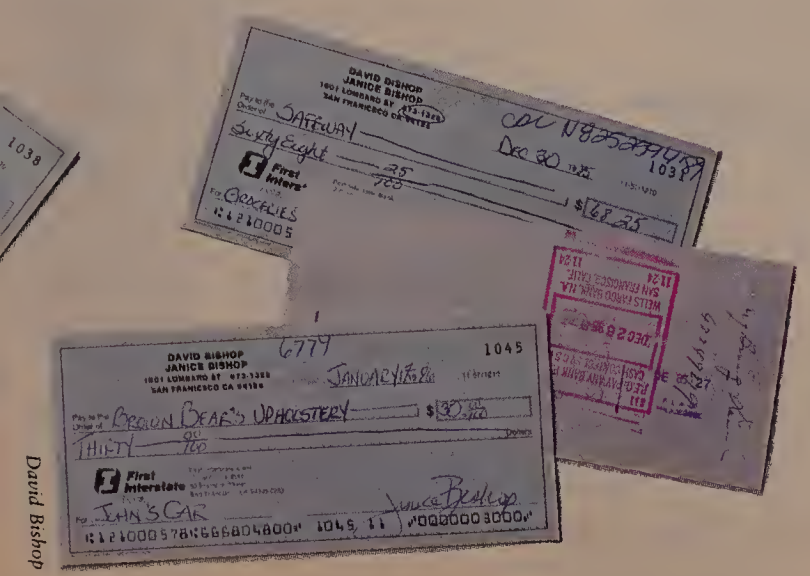

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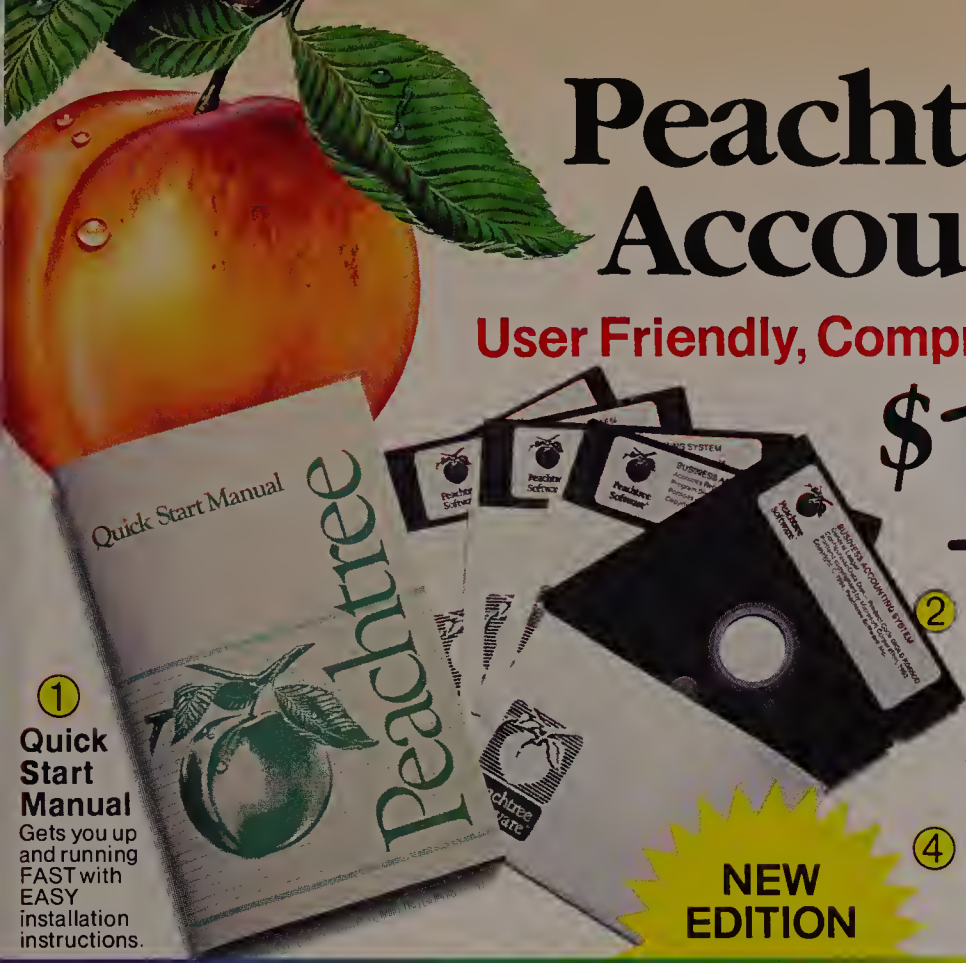

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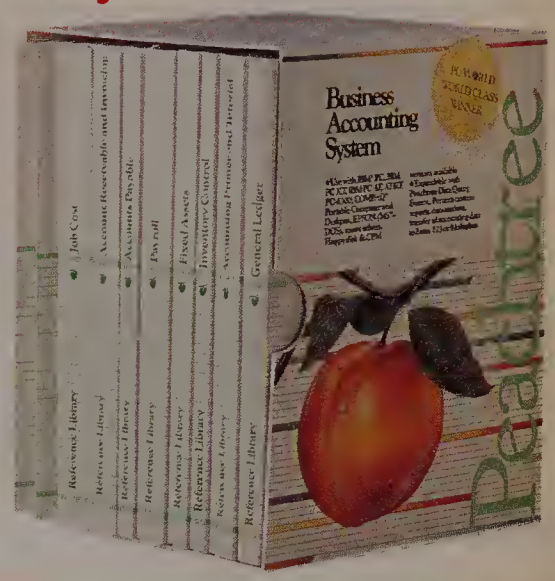

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Screen 1: Deep in the recesses of Ledger Domain resides the check disbursements column. As each recipient and check is entered, the amount is posted to the template's ledger.

Ledger Domain version 2.1
Richard Rapfogel
6219 Washington Ave.
St. Louis, MO 63130
800/222-4747 ext. 3001
List price: $49.95
Requirements: 320K, two disk drives, DOS 1.10 or later version, 1-2-3 release 1A or 2.0
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jockey, it may be beyond your abilities. Using *Ledger Domain*'s menu-driven menu generator, you expand the template's main menu, create submenus by category (bills, credits, and so on), enter the pertinent information on payees (name, address, amount, account code, and so forth), and even insert program prompts. Once the menus are in place, you merely display the desired submenu and specify the recipient. *Ledger Domain* fills in the date, the full name, the amount, and the tax category and posts the entry to the template's ledger.

Before you lace up your Pumas and sprint off to the post office with your order, consider my few reservations. *Ledger Domain* is limited to a single bank account and 40 transaction categories. Although the template will print out a numbered range of checks and mailing addresses for use with window envelopes, you are limited to formfed checks from Deluxe Computer Forms or Nebs Computer Forms. (A minimum order of 250 checks can cost nearly $25—half the price of the program.) And like most templates, *Ledger Domain* doesn't validate data.

In sum, *Ledger Domain* isn't for everyone. It offers more functions than most personal bookkeeping warrants yet doesn't provide the formatted reports most small businesses need. But if you itemize tax deductions, need to budget your personal or family finances, or want to track money earned on the side, *Ledger Domain* is worth the modest disbursement. *—Jeff Angus*

ZBasic

Using BASIC is like watching "Dynasty"—some people love it, some people hate it, but almost everyone does it occasionally. There are few personal computers on the market that don't bundle an interpreted version of the language, but with that broad exposure comes mixed reviews. Interpreted BASIC provides an unbeatable interactive environment for program development but executes the resulting code with exasperating sluggishness. Still, many businesses have a large investment in BASIC and are not about to translate their programs into another language for the sake of speed.

I never considered any other alternative until one of my clients presented me with the herculean task of finding a fast BASIC compiler that offered the convenience of an interpreter. The compiler also had to produce DOS-executable code (that did not rely on a run-time library), be largely compatible with BASICA, and cost under $100.

(continues)

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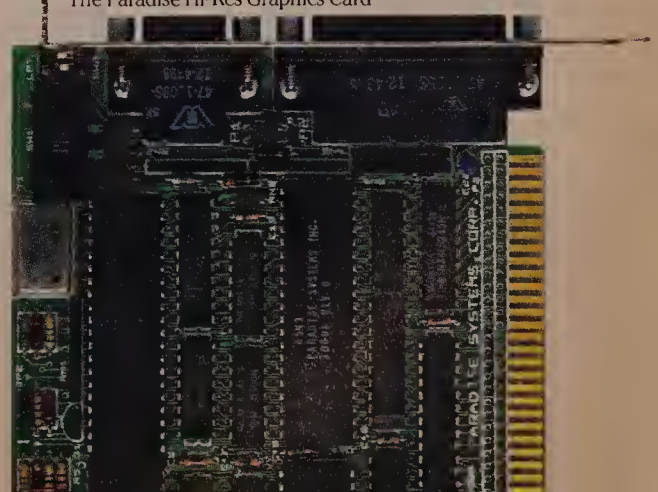

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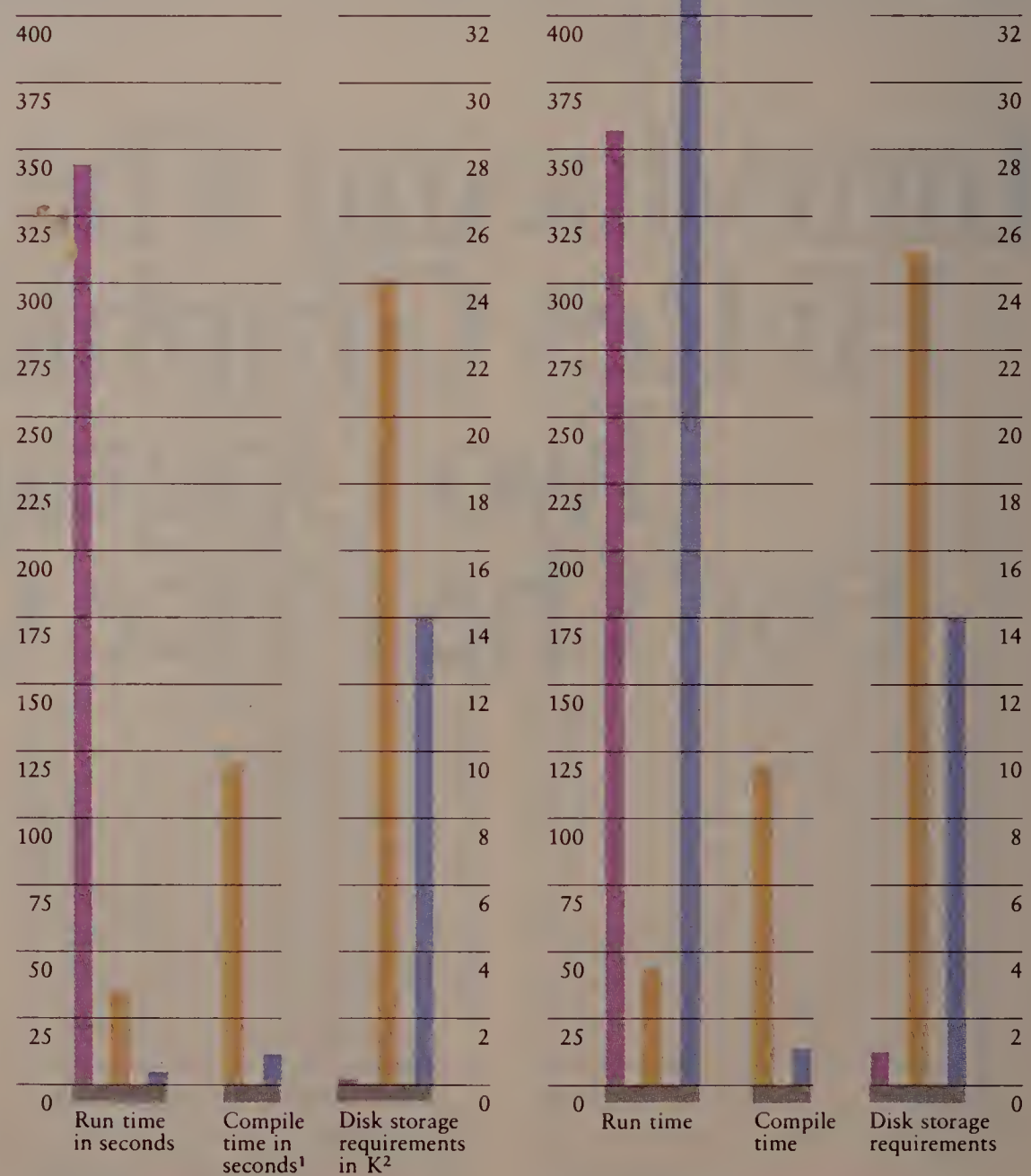
Sound impossible? I thought so, too. Then I stumbled onto the ZBasic Interactive BASIC Compiler from Zedcor. Much to my surprise, it met all of my client's requirements and came with a comprehensive and comprehensible reference manual.

The ZBasic programming environment has the same immediacy as a BASIC interpreter. You can directly execute individual BASIC statements or enter a program, run it, make corrections, and run it again without ever leaving the ZBasic editor. (ZBasic even includes TRON and TROFF equivalents that display line numbers as a program executes.) Once a program is debugged, you can quickly compile it and produce an executable .COM file by simply typing RUN*. The difference between a BASIC interpreter and ZBasic becomes evident only when you run the program. A ZBasic compiled program leaves its interpreted twin in the dust and generally keeps pace with programs compiled by Microsoft's QuickBASIC (see Figure 1).

Perfection, of course, is still elusive. ZBasic programs that rely heavily on floating-point values—primarily graphics and calculation-intensive applications—noticeably drag their feet. In fact, such programs may run faster under the BASIC interpreter. You can boost performance by using floating-point values sparingly and declaring as many variables as possible as integers. Unlike most compilers, ZBasic assumes variables are integers unless told otherwise. The company claims a soon-to-be-released version of

Figure 1: ZBasic, QuickBASIC, and GW BASIC on the RUN. Tests were run on a Tandy 1000 with 384K RAM operating under MS-DOS 2.11. The interpreter tested was Microsoft GW BASIC.



¹ A QuickBASIC compile also involves linking.
² Space required for source code and executable file

ZBasic will support the 8087 numeric coprocessor, greatly speeding floating-point calculations.

In many situations, ZBasic is the right choice for creating business applications. ZBasic compiles programs much more quickly than QuickBASIC, and takes the checkered flag for writing to disk. Its compilations soak up approximately half the disk space of QuickBASIC's. ZBasic supports the IBM Monochrome Display Adapter and Color/Graphics Adapter and, according to the company, compiles 90 percent of BASICA programs unchanged.

But because ZBasic generates device-independent graphics (DGI), BASICA graphics syntax is somewhat different, as are most disk input/output commands. (DGI allows Zedcor to quickly produce new versions of ZBasic for other computer systems and other PC graphics boards.) Zedcor supplies a modestly priced BASICA-to-ZBasic converter that makes the necessary changes; the company claims that version 4.0 will recognize all BASICA commands. ZBasic isn't the only BASIC compiler around, but it's one way to speed up your programs painlessly. *—Dennis Dykstra*

ZBasic Interactive BASIC Compiler version 3.0
Zedcor Inc.
4500 E. Speedway #93
Tucson, AZ 85711
800/482-4567
List price: $89.95, BASICA-to-ZBasic converter $14.95
Requirements: 128K, one disk drive, DOS 2.00 or later version
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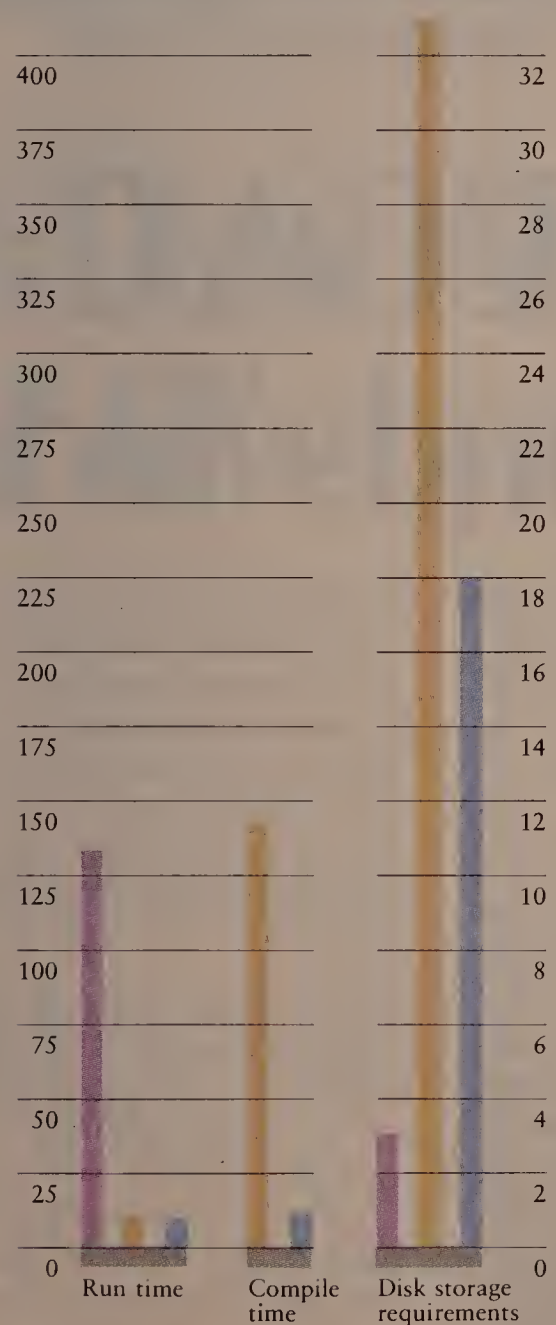
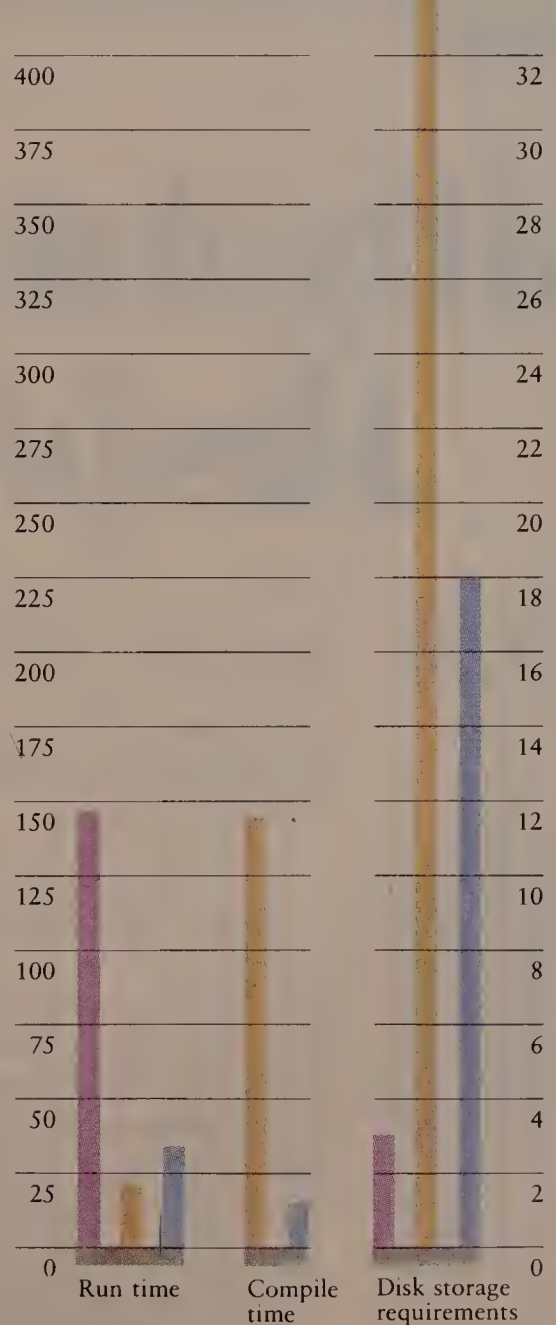
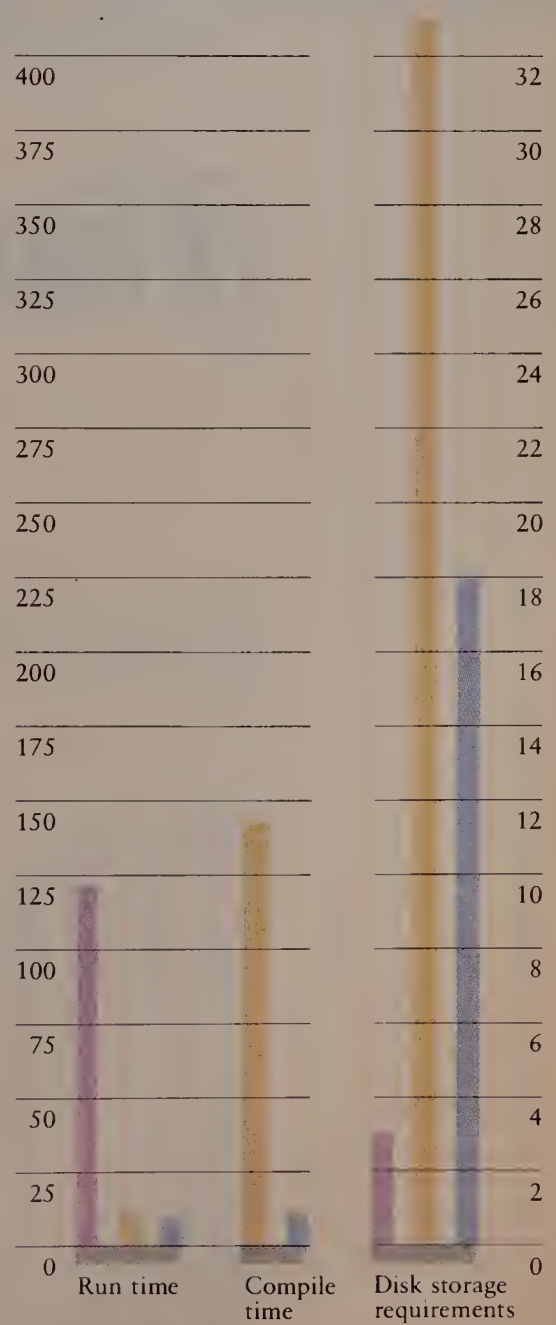


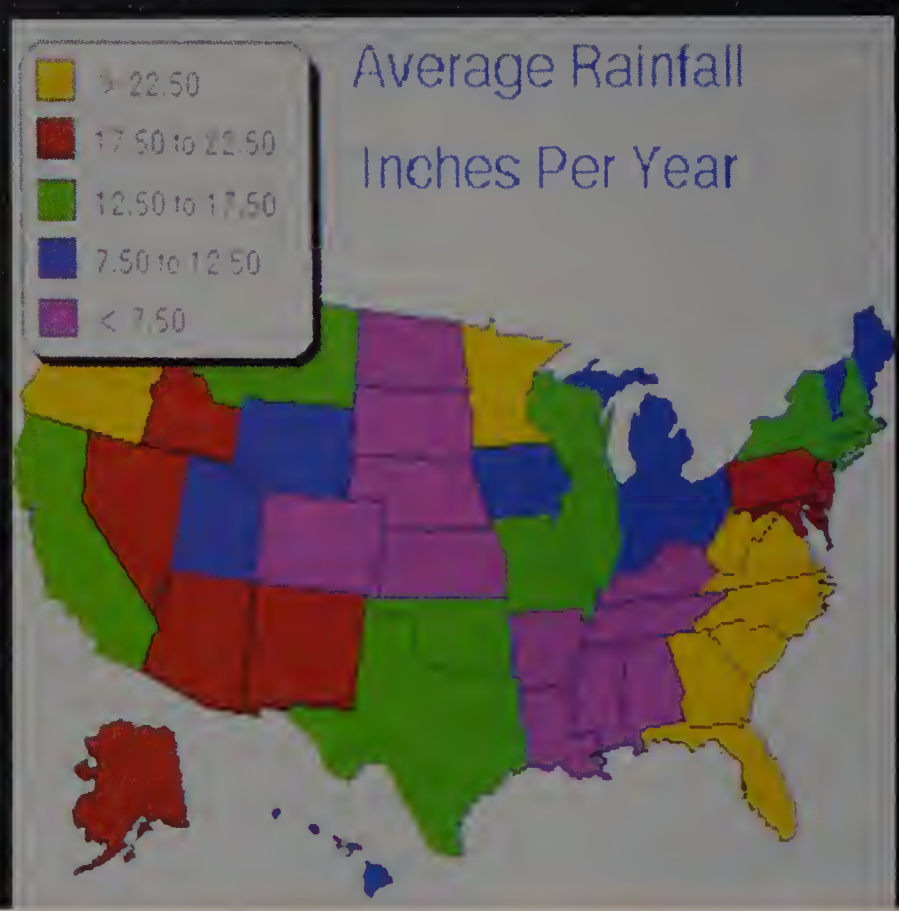
Read 500 random integers, sort in ascending order, write to disk



Read 500 random floating-point numbers, sort in ascending order, write to disk



Read 500 random 3-byte "names," sort into alphabetical order, write to disk



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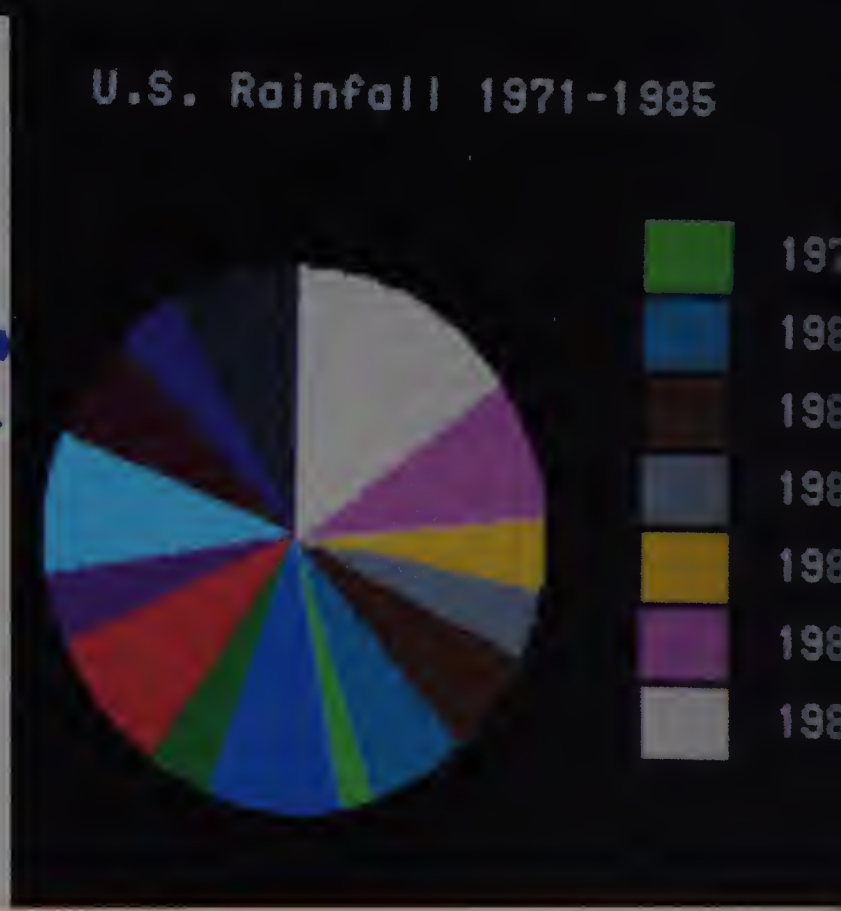

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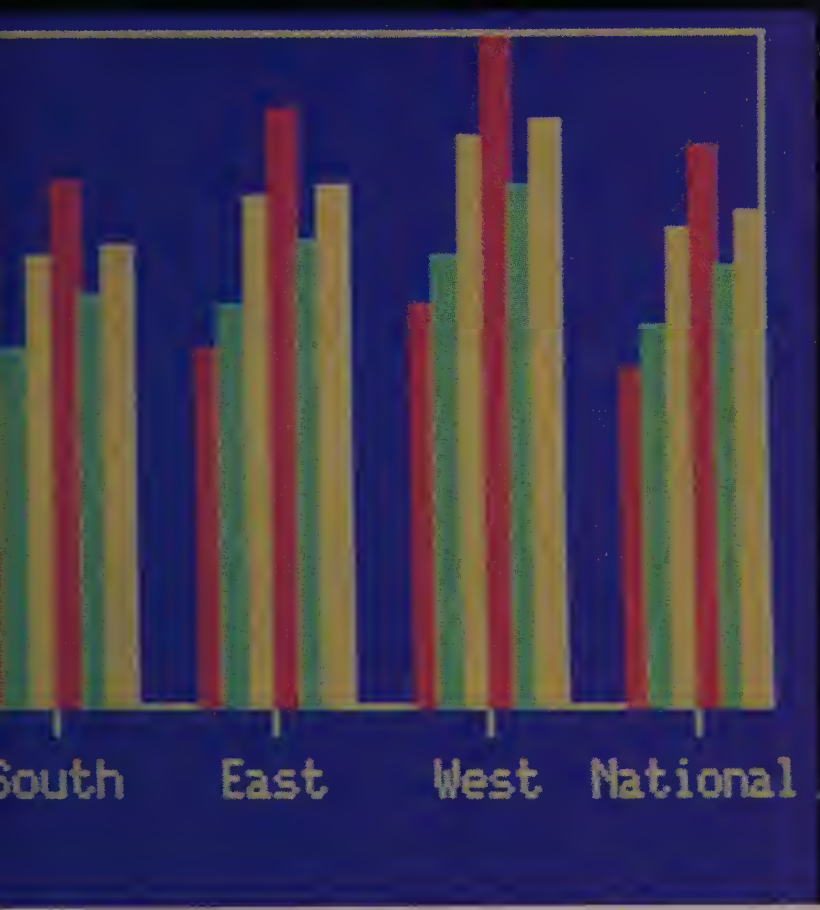

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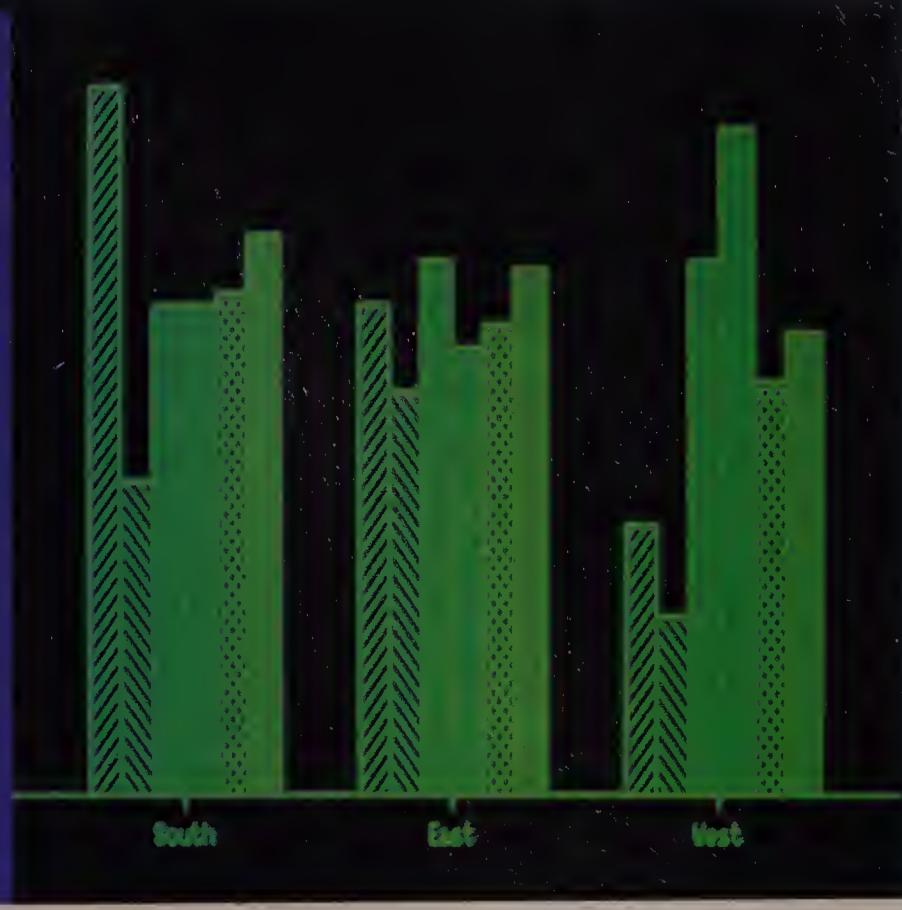

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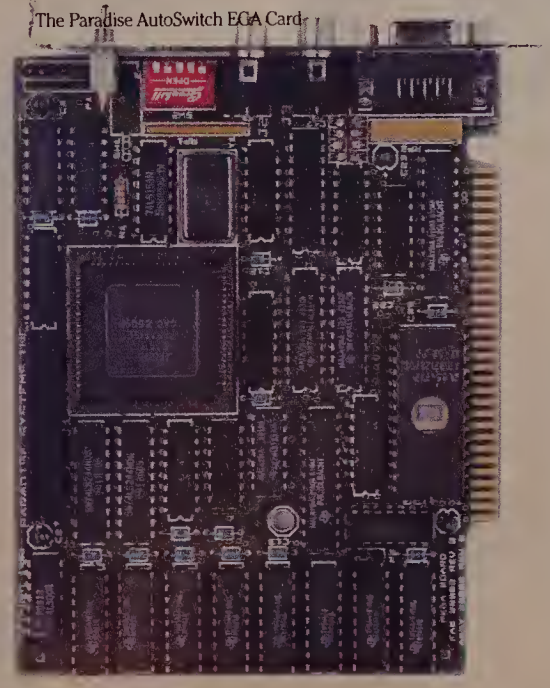

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For the Organization Man and Woman, the outline is the primary compositional infrastructure. Not surprisingly, outline processors, led by Living Videotext's wildly successful *ThinkTank* and *Ready*, have taken corporate computing by storm. Along the way, users have discovered that outline programs are more than just idea tamers—they are able electronic phone books, appointment calendars, and notepads.

Until recently, Living Videotext products were at the eye of the tempest. *PC-Outline* from Softworks Development may change all that, thanks to its artful combination of features and its shareware price. The program can be snatched off bulletin boards for free or had for a few dollars from user groups that share public-domain software, such as PC-SIG. But sending $54.95 to the publisher buys you a typeset manual, some free program updates, and technical assistance.

PC-Outline is clearly modeled after *ThinkTank* and *Ready*, but Softworks has added some welcome touches. You can label collapsed headings and subheadings with Roman numerals, uppercase and lowercase letters, and bullets and use a separate ordering scheme for each indented level. Multiple paragraphs can be inserted anywhere in an outline, and level numbering can be suspended and resumed at will. As with *Ready*, you can drop all or part of

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mands can also be accessed with mnemonic <Ctrl>- and <Alt>-*key* combinations. If you use *1-2-3* and a command-driven program like *WordStar,* your fingers may do some broken-field running across the keyboard at first. Unfortunately, when you unthinkingly issue a command that's safe in *WordStar* but destructive in *PC-Outline,* there's no Undo command to reverse the errant action.

PC-Outline's user manual is a mess and, naturally, lacks an index. You'll have to pore through it several times and play with each command before you'll appreciate this value-packed gem. *—Danny Goodman*

PC-Outline version 1.02
Softworks Development
750 Stierlin Rd. #142
Mountain View, CA 94043
800/538-8157 ext. 844,
800/672-3470 ext. 844
California
List price: $54.95
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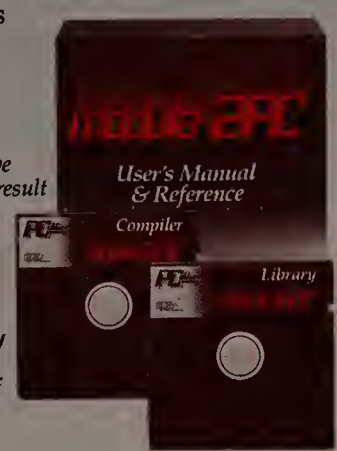

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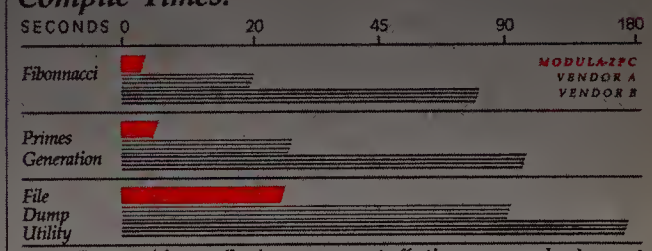

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ease-of-use categories, it beats *Norton* hands down.

PC Tools mimics many of its competitor's functions. Like *Norton's*, the *PC Tools* disk-mapping utility graphically shows how storage is allocated—bad clusters, noncontiguous files, hidden files, and so on. Files can be sorted by name, extension, date and time, or byte and cluster size. You can display a hard or floppy disk's subdirectory structure in treelike form and, without exiting to DOS, create, rename, and delete subdirectories. However, the *PC Tools* text-search function is up to four times faster than *Norton's*; once text is located, you can pop up *PC Tools'* hex-ASCII line editor in a flash. Of course, Central Point Software didn't overlook the Unerase function that made *Norton* so valuable. The *PC Tools* version, dubbed Undelete, similarly retrieves accidentally erased files.

PC Tools fails to provide or sufficiently flesh out certain *Norton*-like utilities. The Verify function identifies bad sectors many times faster than *Norton* does, but it can't mark them so they won't be used in the future. There's no program for completely wiping files off a disk—not vital unless you want to prevent others from peeking into your "erased" files. *PC Tools* also lacks an internal stopwatch and a utility for setting color display attributes.

As if to compensate for these oversights, *PC Tools* includes features that *Norton* lacks. Frequently used DOS functions that format disks and copy, delete, and compare files are always accessible—a particularly attractive feature if you don't own *PopDOS* or a similar program. *PC Tools* works amiably as a memory-resident program. But the price of such convenience is a hefty 128K—too dear even for users with 640K systems. Central Point is working on a new version that will purportedly use only about one-third the memory.

In the final analysis, however, it's price, simplicity, and speed that will sell *PC Tools*. The program's concise and speedy menu

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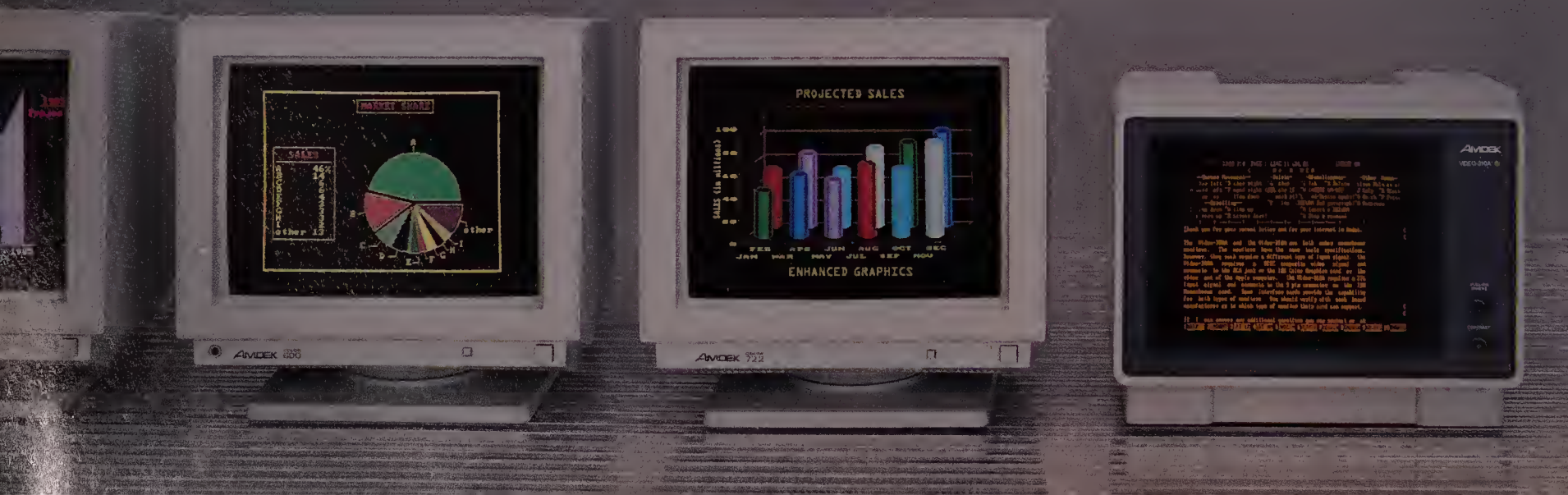

system will save infrequent users valuable time and tempt hard-core *Norton* addicts. If you don't need *Norton*'s esoteric features, but you do want to conserve time and money, place your bets with *PC Tools*. *—Patrick Marshall*

PC Tools version 1.1
Central Point Software
9700 S.W. Capitol Hwy. #100
Portland, OR 97219
503/244-5782
List price: $39.95
Requirements: 192K, 256K in memory-resident mode; one disk drive; DOS 2.00 or later version
Not copy protected

Legalex Calendar System

Had Swiss people-watcher Carl Jung analyzed the dreams of attorneys, he would have found the following archetypal fears: confronting death, losing a loved one, and missing a deadline. The latter is particularly terrifying, because such lapses are a frequent cause of attorney malpractice suits. With the *Legalex Calendar System* from Legalex Software Systems, computerized attorneys can at last sleep somewhat easier. (It can't do anything about death or loved ones.)

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```
CALENDAR                    Adding to Calendar

                Client Code 1234        Matter Code 1234

   Client Name CHARLES PARKER
               AKA "BIRD"
   Matter Name SAXAPHONE SENSATIONS

          Date 05/25/88      Time  03:01PM

     Date Type 1

   Description CONFERENCE WITH CLIENT REGARDING ALLEGATION THAT PATRON WAS
               INJURED BY VOLLEY OF RAPIDLY PLAYED NOTES
     Attorneys JJB/

         Court BIRDLAND SUPERIOR COURT
   Judge/Dept. JUDGE FEATHER
        Source CONFERENCE REQUESTED BY CLIENT

Enter the source of this event.
```

Screen 3: A Legalex data entry screen for adding an appointment

essentially says, "JF is 14 days before CT." When the trial date is set and entered, the program automatically determines the last day for depositing jury fees and makes an appropriate entry in the calendar for that day. Enter another simple formula, and *Legalex* will automatically post a reminder two weeks before the deadline.

The *Legalex* system is made up of four modules: Calendar, Docket, Vacation, and Corporate Records. The Calendar module records the time, date, place of upcoming events, and event descriptions of unlimited length and produces an assortment of useful reports. Docket automatically calculates related deadlines, while Vacation allows supervisors to coordinate staff vacation requests. Corporate Records, the least useful module, tracks the location of important records and notes key dates for corporate clients. Day-to-day use is greatly simplified by the program's *Framework*-style interface, logical and consistent command conventions, and comprehensive manual.

Before the program can do its stuff, reference codes and data concerning a firm's personnel, clients, and client files must be entered into the Calendar. You can then post appointments by entering the applicable client and matter codes followed by the date and time, the type of event (such as hearing or deposition), the description of the event, the court, the judge/department, and the attorneys to be notified (see Screen 3). With the Docket module, you must create a separate file for each

(continues)

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Siblings

Not to be forgotten are our 300/1200 baud modems. The Internal Modem Card is designed for the PC, PC/XT and most compatibles; it occupies one full length slot and the internal speaker lets you know the call progress. An RS-232 serial port is standard, COM1 or COM2; you can use the port for other peripherals when the modem is not being used. Our External stand alone modem can be used with any computer or terminal which utilizes an RS-232C serial port. It also comes with 8 status indicator lamps and a snap off front panel that allows for quick setting of the switches for all types of communication packages. At $139 and $149, these are the best price/performance modems for most communications.

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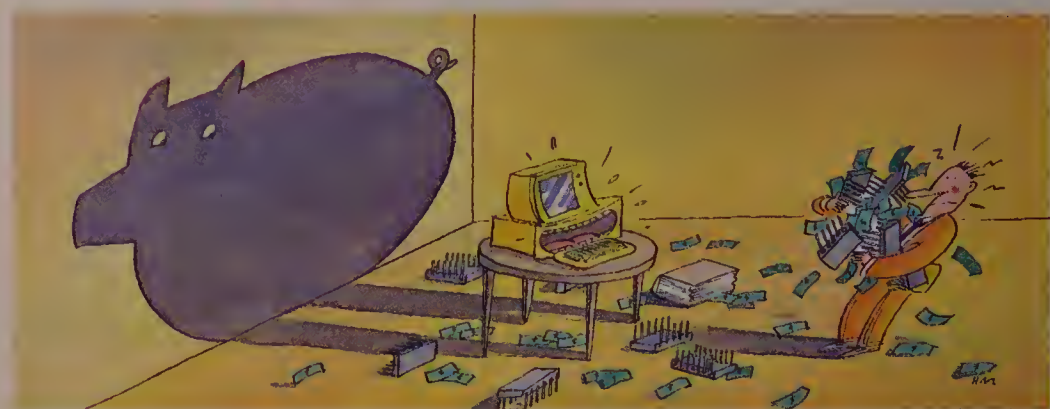

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The Docket module cannot schedule more than one date for events that recur during the course of a lawsuit, such as depositions. If you enter the second occurrence, the due date for the first is purged from the system. Nor will the program flag appointment conflicts or allow you to pass significant dates from the Corporate Records module to the Calendar module.

I'm still waiting for the ultimate management program that will practice law while I stay home and play the guitar. *Legalex* isn't it, but it's a step in the right direction. –*Jordan Breslow*

Legalex Calendar System version 1.04
Legalex Software Systems
101 Embarcadero St. #200
San Francisco, CA 94105
415/989-3030
List price: Calendar and Docket $995, Vacation $250, Corporate Records $250
Requirements: 512K (640K recommended), 5MB hard disk, DOS 2.00 or later version, 8087 supported
Not copy protected

Jeff Angus is a systems analyst for Boeing Computer Services. Danny Goodman is a Contributing Editor to PC World *and* Macworld. *Patrick Marshall edits the Opinion Page of the* Oakland Tribune. *Dennis Dykstra is a software consultant and freelance writer based in Pasadena, California. Jordan Breslow is an attorney and legal automation consultant in Walnut Creek, California.*

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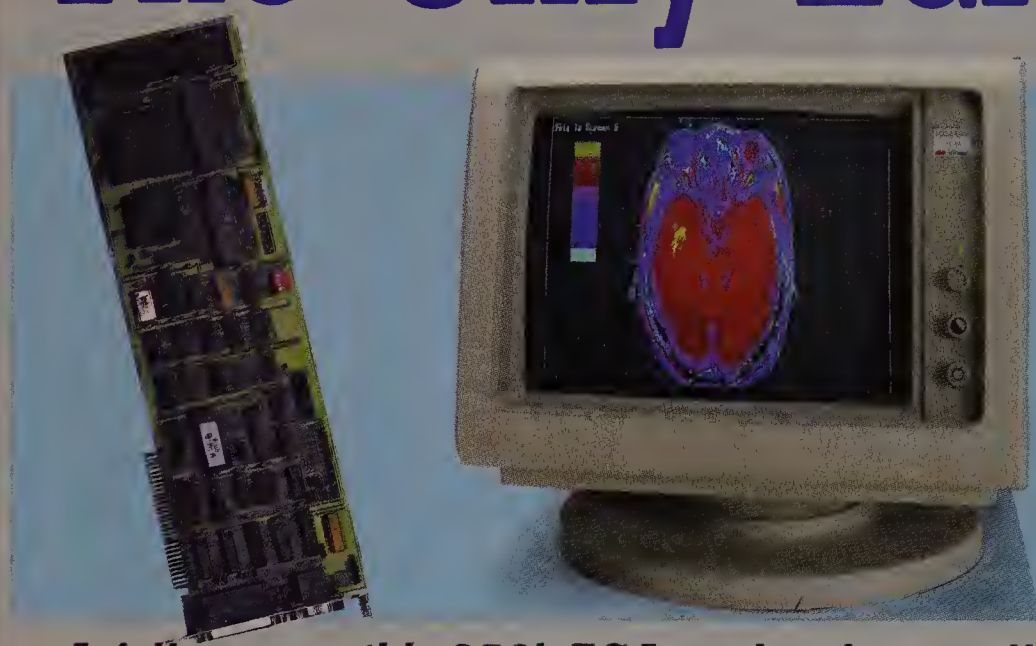

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Circle 658 on reader service card

court that includes the court's holiday schedule and specifies the relationship between fixed and relative dates set by the court's rules of procedure.

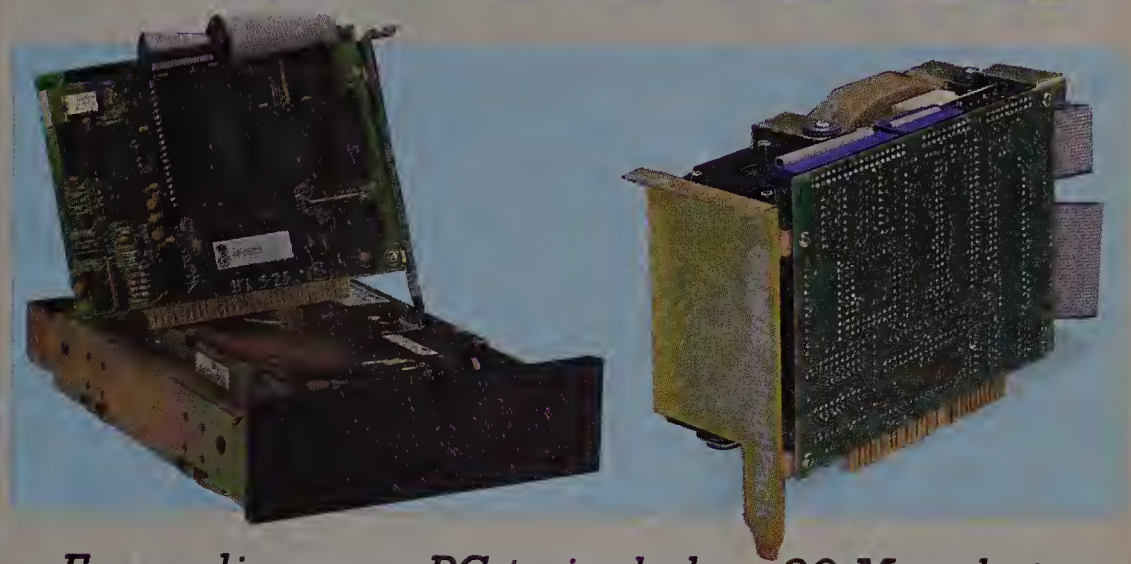
The Docket module is a two-edged sword. Used carefully and religiously, it can avert deadline-related malpractice. But setting up court files is an exacting and time-consuming project. If they contain erroneous or obsolete rules, relying on the program can institutionalize malpractice throughout a law firm. For premium's sake, all entries in a court file should be cross-checked by at least one other attorney or paralegal.

Law firms will welcome *Legalex*'s straightforward report generation. Information can be sorted by attorney, client, or date, making it simple work to prepare a calendar showing all upcoming events in a particular case between two specific dates. The program lists all the entered appointment fields; you merely highlight those you wish to appear in the report. The first field you mark is placed in the leftmost column, the second field, a column to the right, and so on. This format can be saved to disk, and you can preview the report before committing it to paper. Unfortunately, *Legalex* tries to fit everything on a single line, severely limiting the number of fields you can select. For a program priced at $995, such inflexibility is unacceptable.

Although *Legalex* is one of the most capable calendar systems on the market, it's overpriced and hampered by some serious flaws.

(continues)

Hard Solutions



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The Information Center Holds

Business is brisk at Sikorsky Aircraft's information center in Stratford, Connecticut. Bruce Fafard, information center supervisor (standing at left), checks out a data base query. The author (next right) and Elizabeth Lucas-Stephens, manager of end-user computing, congregate at the center workstation.

enter

The information center has emerged as the corporate mediator between micro and mainframe. This unassuming operation enables PC users to take their data bases—and their destiny—into their own hands.

Judy Lawne

Shaku Atre

You're a sales manager in a large consumer products corporation. Your company recently launched a new product in a highly competitive marketplace where similar products are firmly entrenched and where yet another competitor has just unveiled its latest entry. Your company has developed a detailed market profile for your product, set aside financial resources to support the product's launch and continued promotion, and devised a reporting system to assess the market's verdict.

Responses from sales reps around the country reveal that the new product seems to be succeeding as planned in Oregon; falling on its face in Florida, where sales estimates had been excessively optimistic;

and exceeding all expectations in Texas. A follow-up promotional strategy is appropriate in all three states.

As the product introduction proceeds, an unforeseen situation demands a number of swift decisions. You need access to a storehouse of data located in a mainframe data base. You can't wait until next Tuesday for useful, synthesized information. You must buttress decisions on where to concentrate the next follow-up promotional effort, which competitor to counter more aggressively, how much to spend. You're seeking competitive analyses, inventory reports, budget projections—data of a historical, geographical, and financial nature, plus marketing and production statistics and enough fresh, random sales data to fly with. Where do you turn?

Enter the Center

You surely do not turn to the minders of the mainframes within the MIS (management information systems) department, where, given the press of other business, a plain English query is likely to be ignored. You could ferret out your local PC guru, but that stratagem won't help you navigate the labyrinthine corridors of corporate data processing.

You might, however, turn to an information center (IC) for quick relief. An IC equipped with appropriate software and a sound understanding of the corporation's business can interpret your problem, pull together data stored in various data bases, and deliver to your office an instructive snapshot of the overall sales situation.

That, at least, is the hope and the promise of the IC—an increasingly popular corporate institution built upon a simple idea (that frequently turns complex in the execution). For PC users in the Fortune 1000, ICs represent a welcome avenue to the mainframe, a helping hand from the MIS department, and a growing commitment to personal computing.

An IC is fundamentally a consulting and service facility, within an organization, that allows departmental PC users access to their own data wherever it resides. In the best of circumstances, the IC's motto is, Nothing succeeds like access.

The IC aims to provide training and guidance for virtually everyone in the company, to achieve the right mix of hardware and software, and to make available as many of the corporate information resources as the powers-that-be deem judicious. While the IC acts as a buffer between the PC and the mainframe, it also strives to establish synergy between mainframes and micros.

Order in the Corp.

Because the real world of business exists in bits and pieces, not in bits and bytes, the corporate environment is often unkempt. Surprises abound, and rapid response to the unanticipated is routine. ICs, carefully staffed and attuned to the idiosyncrasies of a particular business, offer tools that can quell corporate panic and ease decision making.

Impressive numbers of businesses have implemented ICs or are doing so now. IC installations have been growing at a 20 percent annual clip since 1980; by the end of 1985, 6000 were in place nationwide, according to the research firm Computer Intelligence. The American Management Association counts ICs in 40 percent of all businesses; for companies with more than $1 billion in annual revenues, the figure swells to 80 percent. ICs are especially favored by manufacturing and insurance companies; some firms support multiple centers, assigned to various departments.

IC installations have been growing at a 20 percent annual clip since 1980; by the end of 1985, 6000 were in place nationwide.

Whether known as the "user services organization," the "microcomputing center," or by any other name, the IC began life as a service entity pegged to mainframes. As the collective power of PCs surpassed that of the big machines, ICs shifted their focus to microcomputing: In essence, they replaced dumb terminals with brilliant workstations.

As the name implies, ICs deal in *information*—a concept that maintains more than a semantic distance from *data*. Information is carefully structured data delivered on demand to assist end users in decision

making. Raw data might be described as unstructured information. Even if managers use the terms data and information interchangeably, they invariably seek and require information.

IBM Canada formally inaugurated the IC in 1980 as a means of realizing several key business objectives (most notably that of eradicating the backlog in mainframe system development). By then the notion of decentralized data processing had already established a foothold. The IC was intended to satisfy increasingly restive end users and distribute information as needed by fully exploiting personal computers. The trick was to do so in a way that meshed with installed mainframes and minis.

The growth of the IC has changed data processing from a supply-driven to a demand-driven function; that is, users—not technologists—can now begin to direct corporate computing (see Figure 1).

Profiling the Audience

To paraphrase Pogo, We have met the end user and he is us. All effective marketing organizations know who their customers are, what they need, and why they need it.

End users include DP (data processing) professionals and non-DP employees alike. The bulk of the IC's constituency falls into the latter category, by all accounts a diverse population of white-collar workers, most of whom have only a glancing familiarity with computers. An end user may be anyone from a high-level manager making long-range strategic plans to a clerk accessing data for a middle manager engaged in financial analysis or sales. In any case, the typical end user needs specific information in a hurry and lacks the staff to get it.

In most corporate settings, end users approach the IC from one of three distinct levels of management: strategic planning, management control, or operational control. If you know a user's management level, you can usually determine the nature of the query and the data required. Strategic planners seek ad hoc, unstructured data, often from external sources; at the other extreme, operational managers—who are concerned with corporate performance on a day-to-day basis—initiate detailed, often repetitious queries for data.

Getting Off the Ground

To give business users access to their data, the IC staff must sift through scores of different personal computers and peripherals, somehow render judgments on the tens of thousands of programs on the market, and create PC-supported workstations in the center itself and throughout the corporation. By any measure, that's a tall order. For this reason, launching an IC is generally handled with consummate caution.

When an IC is just taking wing, for instance, it's a virtual satellite of the MIS department; as the

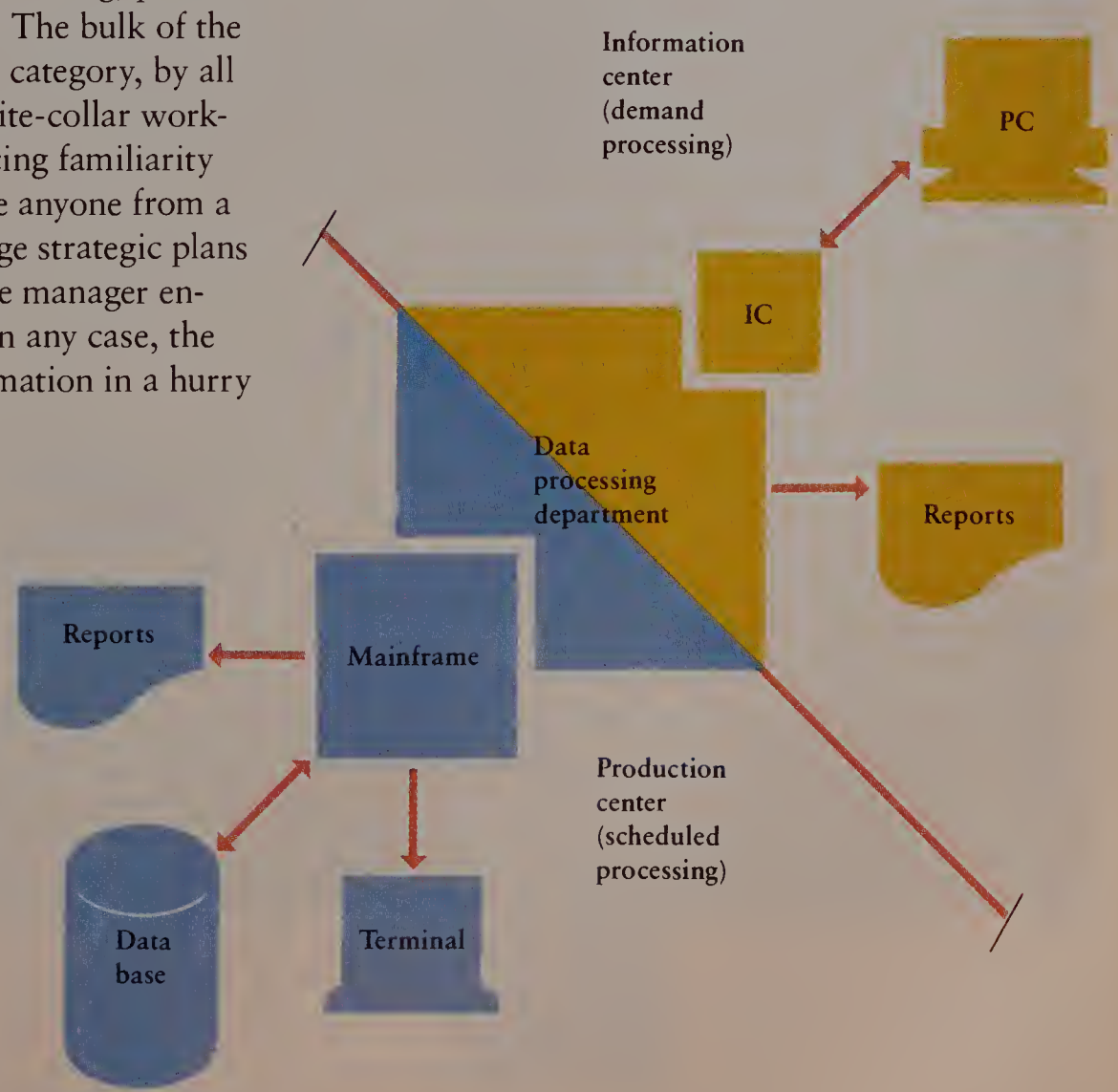

Figure 1: The information center—the new mainstay of demand processing—is a chip off the traditional data processing block.

For MIS Managers Only

Establishing an information center requires adhering to a few proven rules of the road. Even if you're on the receiving end of the IC juggernaut rather than the delivery end, the following implementation rules may make your interaction with the center more rewarding.

Make the IC's first client-department a profit center. If several profit centers are good candidates for IC support, select the one whose end users are most enthusiastic about the IC concept, then identify their requirements for data access. What types of ad hoc queries cannot currently be handled? What sort of financial modeling will generate additional revenue? What types of reports will help managers make better, quicker decisions?

Select the IC staff. Because the IC's major job is consulting, its personnel will require patience and fluency in the language of business. Staff members must help users cut through the jargon that envelops data processing.

Select and install initial products. Two or three programs are apt to be all the IC staff can manage initially. Which products are chosen depends on the requirements outlined by the inaugural departmental user group. Consider fourth-generation programming languages (such as Focus and Ramis II), graphics packages (like *Tell-a-Graf*), statistical analysis programs (*SAS*), and spreadsheets (*1-2-3* or *Multiplan*). Business in IC software is mushrooming, and worthwhile products abound—but IC staff members should be able to distinguish between the nutritious and the toxic. Products should be introduced gradually to keep training to a minimum.

Implement an interface to link products. After selecting the first products, the IC staff should develop a software interface or a menu-based shell so users can access each program without having to learn several sets of commands or mnemonics. Determine whether a suitable interface is available commercially for the products you use and how many of these "front ends" you need. As a rule, the IC staff should help users develop applications rather than take the initiative.

Test user applications and evaluate the results. ICs are ideal for application prototyping and bringing users up to speed on new applications. Of course, it's best to avoid buggy or premature programs; if a running system impresses users in one way, one that's crash-prone strikes them in quite another.

Involve additional users. Once the IC endeavor has developed momentum, adding more users will be a breeze. But keep your first project simple to avoid overloading the system. —*S. A.*

IC matures, it gradually weans itself from the DP hierarchy. Initially, however, IC consultants solicit technical help from MIS managers, who might be asked to provide guidelines on downloading from the mainframe, handling new software releases, the quantity of data base records to access, the time of day for quickest response, and so on. Attempts to start an IC without such assistance are likely to falter.

An IC usually has no more than three or four cofounders: a consultant whose expertise lies more in business than in technology, an IC manager with a knack for corporate politics, and a technical consultant who has business acumen and isn't simply a DP retread. When established, the center can be staffed by as few as four consultants or as many as ten. Initially, the IC staff assists users in obtaining passwords, initiating data access sessions, recovering and archiving data, and keeping data secure.

The size of the center's staff has less to do with the number of clients it serves than with the intensity of their computing activity. If users each spend 45 minutes a week with an IC consultant, each consultant can support up to 40 users; given higher user demand, the ratio could drop to 20 to 1, but probably not much lower.

In most cases, the IC is housed some distance from the MIS department. Centers usually adjoin common, heavily trafficked areas like the company credit union or cafeteria. Early on, when training is most rigorous, users meet consultants on the latter's home turf; in time they graduate to the telephone.

An IC can open its doors with just a handful of PCs running application demos for a departmental user group; in due course, the number of customers can be expected to grow. ICs are charged with overseeing hardware and software procurement, preferring to issue diplomatic "guidelines" rather than arbitrary "standards." Centers first define various broad application areas, then limit the choices within each category. Some centers let users do their own buying through an in-house computer store. At the IC shop, everybody wins: users receive discounts, and the company retains control over software distribution.

ICs don't come cheap. Start-up budgets typically exceed $1 million, evenly split between salaries and expenditures for basic equipment. Most corporations devise elaborate charge-back systems that enable the IC to recover at least a portion of its costs (see "Are Corporate PCs Earning Their Keep?" in this issue).

Items on the prototypical shopping list for a fledgling IC range from the mundane to the sublime. ICs need everything from desks to dot matrix printers to hard disks of 20MB and up. Also likely to be on

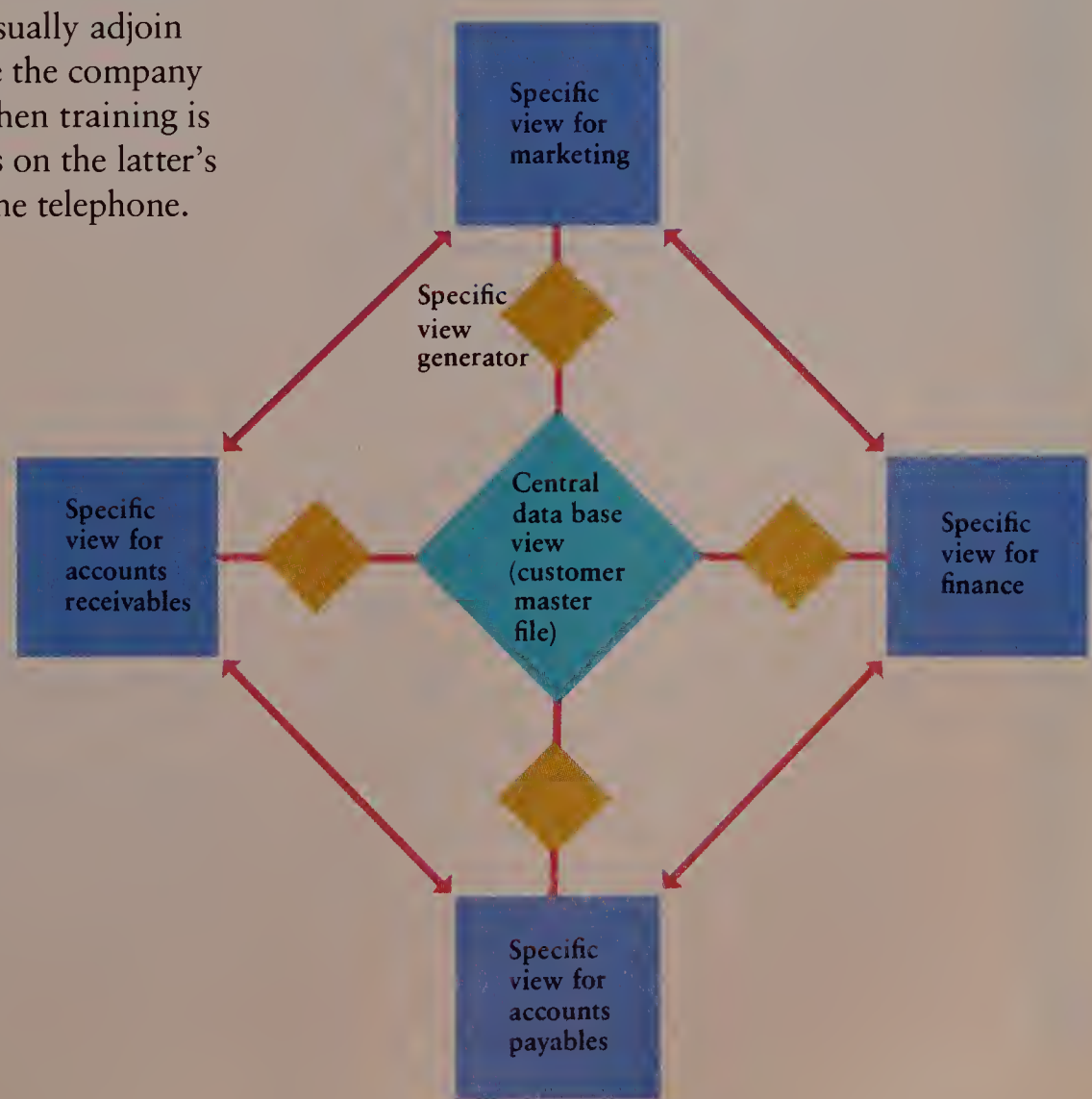

Figure 2: Information center consultants can create subsets of the central data base, enabling departmental users to access specific views; the views themselves can then be connected.

the list: management tools for project planning, online data bases of software designs, multiuser hardware and software support, interactive video training packages, charge-back software, surge protectors, and file-backup utilities.

A Is for Applications

Software consulting is the IC's forte. On the IC's software shelf are commercial applications and programs developed within the corporation—but rarely by the IC staff. Center consultants don't write programs for IC users simply because the IC isn't designed to supplant the conventional application development process (see the sidebar "For MIS Managers Only"). However, this stance is not inconsistent with the IC mission of advancing end user access to data.

Even in an imperfect world, users in the finance department, for example, should be able to transfer data and applications between the mainframe and PCs, without knowing or caring where their data resides or how it's accessed. The scheme in Figure 2 shows how an IC might help users access their data.

In this case, a customer master file (or data base) resides under a mainframe data manager like Martin Marietta's Ramis II or IBM's DB2. Data, re-

Systems, the IC Way

Even though it's replete with off-the-shelf PC software, the information center classifies programs in a distinctive way. Applications can be divided up into two broad categories.

Prompt answer systems condense and format data—such as sales summaries or geography-dependent product prerequisites—to support managerial decision making. Information may be required regularly or only once, but all prompt answer systems are designed to field urgent, unanticipated requests.

One variant is the *trigger-driven system,* which indicates whether, for example, cash flow has dipped below a certain level, or sales have failed to meet a specified quota.

Organizational support systems are intended to foster peak departmental performance by speeding information storage and retrieval. And no wonder—according to one estimate, manual data retrieval consumes 15 percent of the typical business professional's time. Organizational support systems should also be able to analyze, compare, and consolidate data. Finally, they must be capable of rendering forecasts and plans.

Accordingly, these systems are known as productivity tools, a category that includes spreadsheets, online time sheets, text processors, training packages, and electronic mail programs. Implemented by the IC, such applications provide direct assistance in fairly routine business tasks that don't merit DP department involvement.

Organizational support systems aren't confined to personal computers but flourish on various levels of the computing continuum: as applications like payroll and accounts payable in the mainframe arena; as multiuser programs on local area networks; and as productivity software on PCs, which are nominally standalone machines but also support micro-to-mainframe links.
—*S. A.*

sources, and responsibilities are distributed throughout the company; specific departmental views are, in turn, stored on PCs. Specific *view generators* developed by the IC could hasten downloading and uploading between the mainframe data base and view data bases on PCs.

Apart from this kind of hands-on help, ICs follow certain criteria in selecting applications, often working backward from results: Will a report be needed every week? Will the job require more than 5 minutes of mainframe CPU time? Will the given application consist of more than 10,000 data base records? Such criteria determine whether the problems are grist for the IC or belong within the purview of the DP shop (see the sidebar "Systems, the IC Way").

Because clients are likely to be novices, ICs put a premium on lucid documentation, clear menus and commands, and logical program organization. At a bare minimum, the IC library includes PC software in eight categories: spreadsheets for numerical analysis, word processors for company correspondence and reports, business graphics, statistical reporting, communications software for remote data access (including both public and private data bases), electronic mail, project managers, and data management.

ICs are charged with overseeing hardware and software procurement, preferring to issue diplomatic 'guidelines' rather than arbitrary 'standards.'

Nearly three-fourths of all ICs draw on a central corporate data base, accessible through such products as Cullinet's IDMS/R, Information Builders' Focus, IBM's IMS, or Software AG's Adabas. Some 40 percent of ICs regularly use graphics and statistical analysis software, with financial modeling programs not far behind. ICs occasionally use programs that extract mainframe data, then massage that data with popular PC applications like *1-2-3* and *dBASE III* (see "Painless Extraction," *PCW*, July 1986).

Centers also stock applications like *PC/Focus* that complement mainframe products and provide a *fourth-generation* (or nonprocedural) language capability (see "A New Focus on Data Management," *PCW*, February 1985). Nonprocedural languages dramatically speed application development and enable users to make their own queries—obviously an attractive proposition for the IC. Some products eliminate the need for generation, recompiling, and debugging. And with the advent of "4 1/2-generation" languages like *Intellect*, an English-based query system, the IC may enable anyone to become an application programmer.

ICs in Orbit

Are ICs and PCs inextricably entwined? That largely depends on the kind of software—whether built or bought—in place at the center. IC software has to be more than user-friendly; it must be user-obsequious.

With that in mind, look for ICs to become increasingly involved in building and using expert systems and inferential, rule-based programs. IC users are, after all, the experts.

ICs are molded by a creative tension between DP professionals and business users. The center must finesse the delicate matter of centralized corporate data; few users, after all, need to peek at everything in the company vault. On the other hand, sales managers can hardly plan without access to financial and other data that isn't "theirs." To be able to deliver data on demand—with discretion—to a department that must make quick, bottom-line decisions remains the IC's challenge.

Shaku Atre is a consultant on information centers and heads Atre International Consultants in Rye, New York. This article is adapted from her book, The Information Center: Strategies and Case Studies *(Atre International Consultants, 1986).*

Gateways at LANs' End

Linking PCs with a local area network can be the first step toward bringing the company mainframe a little closer. If you need mainframe access, consider using a network gateway—a practical, cost-effective communications channel between a group of PCs and the corporate data base.

Roger Addelson

If you've already installed or are about to install a local area network (LAN) and you need access to the remote mainframe at a reasonable cost, you're a candidate for a special class of communications product. You can designate one of your PCs as a *gateway* to the mainframe—and spend far less than you would to equip each workstation with 3270 emulation products (see "3270: IBM's Extended Family," *PCW*, June 1986). Traditional 3270 emulation is geared to single-user systems; gateways, by contrast, are meant to shoulder the burden of mainframe communications in a shared-use setting. Once established, gateways are relatively unobtrusive, honoring both network and stand-alone functions while providing access to the mainframe. Just by striking a key, network users can toggle between the network and terminal emulation.

Robert Bauer

IBM

Anatomy of a Gateway

A gateway simply coordinates communications between two dissimilar systems. Although other types of micro-to-mainframe links serve a similar purpose, a gateway emulates protocols of the target system; you can actually use mainframe programs rather than merely shuttle files around. Note that gateways differ from *bridges,* which link similar networks, whether local or of the IBM SNA (Systems Network Architecture) variety.

3270 devices connected to mainframes run under one of two protocols: SNA or bisynchronous; gateways supporting 3270 emulation usually run under SNA. When considering a gateway, don't worry too much about the physical layout of your network (i.e., whether it's a bus or a ring), its access scheme (token passing or collision detection), or its cabling (twisted pair or coaxial). What matters is the gateway software's ability to work with SNA and the network operating system. Once you've installed a gateway, any PC on the network can perform 3270 terminal emulation, seamlessly import and export data, and gain access to any application or data storehouse residing on the mainframe. And with the advent of NETBIOS as a de facto network standard, expect a baby boom of gateway products supporting it. (Slightly ahead of the pack, IBM recently expanded its offerings with a 3720 communications controller, which links mainframe hosts and the Token-Ring network. The 3720 is priced at a relatively low $26,000, plus $5500 for a Token-Ring interface.)

SNA gateways fall into two categories: dedicated hardware that connects to the network and a more economical—but somewhat limited—hardware/software combination that converts an existing networked PC into a *gateway server.* To perform that transformation, you must install a special communications adapter in the designated PC (alongside the network board) and connect the computer by modem to the mainframe.

Because all data from the network is passed to the mainframe over a single modem line, the mainframe treats the entire network as one peripheral. Since gateway functions run as applications under the network operating system, you can still use the gateway server as a workstation on the LAN.

The key to making the most of a gateway is remote access to the mainframe. Any network of up to 32 users that can connect to the mainframe by a telephone line is an excellent candidate for a gateway.

The Price Is Right

The key to making the most of a gateway is remote access to the mainframe. Any network of up to 32 users that can connect to the mainframe by a telephone line is an excellent candidate for a gateway. Economy is a hallmark of gateway implementation. Even large firms with deep pockets find financial reasons to install gateways; among the most compelling is the need to offset an often considerable outlay for the existing LAN. Indeed, because a gateway provides features comparable to those of dedicated 3270 terminals—and performs at about the same level—the best argument for a gateway is its price. The gateway server replaces IBM's expensive ($16,000) 3274 cluster controller (see Figure 1) more efficiently than other methods of 3270 emulation. You can, for example, buy a $1000 add-on board that lets a PC emulate the IBM 3274 cluster controller, but you can connect only three additional PCs to the controller emulator. And even if you don't find the expense of the board and 3270 emulation software prohibitive, remember that each cluster requires a separate port on the mainframe. A LAN gateway, by comparison, occupies only one port, and you can efficiently run as many as 32 3270 emulation sessions on one gateway server.

The hardware requirements of a gateway don't add much to the usual litany of network components: software, cabling, interface boards, hubs, and adapters. The LAN wiring is the gateway's medium, and the gateway software provides terminal emulation and file transfer between the mainframe and the PCs. The gateway PC itself usually requires only 256K to 512K of RAM; each networked PC can get by with 256K and a single floppy disk drive.

Gateway software runs about $125 for each user, and an intelligent gateway interface board shouldn't exceed $2000 (including a communications coprocessor and additional RAM dedicated to gateway use). Add to that a small outlay for a modem to connect the gateway and network to the mainframe, and the system is complete.

At the checkout counter, the cost of terminal emulation quickly surpasses that of a single gateway. Terminal emulation products that directly link a stand-alone PC to a mainframe will set you back roughly $900 for each PC; each PC also needs its own modem. For terminal emulation products that serve a group of PCs connected to a cluster controller, hardware and software for an eight-user cluster can cost as much as $9500, in addition to the $16,000 for the cluster controller itself.

No Free Lunch

While a gateway may be an economical solution, don't assume it's a simple task to get it running on the LAN. Because gateway servers run file transfer and terminal emulation software "on top" of the network operating system,

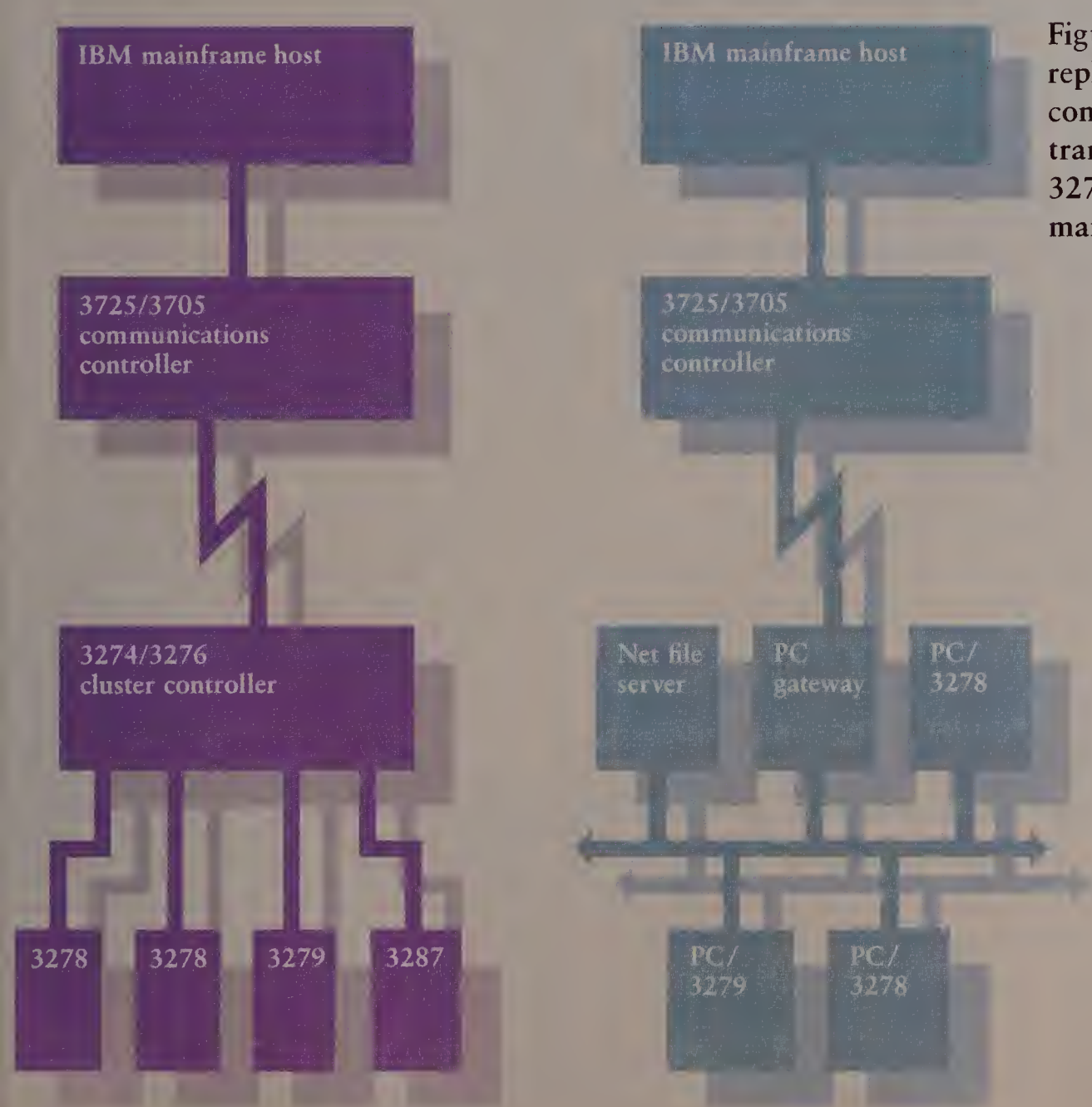

Figure 1: The gateway server replaces the expensive cluster controller that manages data transmissions between IBM's 3270 terminals and the mainframe.

Choosing and Using a Gateway

While installing gateway hardware is as simple as inserting an add-on board in a PC, installing the software is a far more intricate procedure. You must configure the gateway server and user PCs to act like a mainframe cluster controller and 3270 devices. The individual network boards installed in each networked PC enable them to communicate with the gateway server, and the communications hardware in the gateway server links the PCs to the mainframe over a single modem line.

Gateway products are more similar than different, but each vendor's approach varies. Though you must install network hardware and software to run any gateway, actual system requirements for user PCs and gateway PCs differ with each product. A gateway is only as portable as the network operating system on which it runs. For example, Pathway Design's netPath gateway operates on any LAN that runs Novell's Netware. AST's AST-SNA/BSC Gateway requires 186K of memory for gateway use alone on each user PC on the network; similarly, each user PC must have an AST or compatible LAN board installed that will run on a network supporting IBM NETBIOS. In addition, the gateway PC contains a communications server board (supplied with the gateway package) that attaches to a synchronous modem. SNA gateway products use relatively expensive high-speed synchronous modems to transmit data, in keeping with IBM mainframe protocols.

Several concepts are worth examining before you set up the gateway. The most important are *physical unit* (PU) and *logical unit* (LU). A physical unit is any piece of hardware on any system. The mainframe itself recognizes the network and gateway as a physical unit; similarly, the gateway operating system recognizes PCs, displays, and printers as physical

```
                    AST-SNA GATEWAY CONFIGURATOR VERSION 1.00AA
↵ = [default], PgDn = define keyboard, Ctrl/Break = abort, ESC = write file
CONFIGURATION FILENAME [GATE.DAT] :
INTERFACE CARD ADDRESS [:320] :
INTERRUPT REQUEST LINE [5] :
NRZI [N] :
DATA LINK ADDRESS [:B0] :
IDNUM [:00136] :
IDBLK [:017] :
TERMINAL'S LOCAL ADDRESS [02] :
DISPLAY TYPE [M] :
DISK PRINTER AVAILABLE [N] :


PRINTER AVAILABLE [P] :
PRINTER'S LOCAL ADDRESS [33] :
PRINT LINE LENGTH [80] :              132_
PRINTER PORT (LPT) [1] :




INFORMATION: Length of print line
CHOICES:  80 | 132
```

Screen A

units. When you configure the gateway, you must indicate not only what the hardware does but where it is. A logical unit emulates a device that performs a specific function. For example, a physical device (PC and printer) can act as one or more logical devices (3270 terminals and printers).

If a networked PC has access to the file server's hard disk, when configuring the system you must associate (or map) the PC to the file server. Think of the configuration process itself as a map, indicating routes to and from each stop on the network (see Screen A).

This configuration map also shows the nature of the routes available to each user—part of the configuration process is assigning each user access rights and priorities. Most networks will let you deny certain functions or types of access to specific users. Usually, these rights must be associated with the user's log-on and password and included in the configuration files. Some gateway software comes with a configuration program, while other products rely on the LAN's own configuration progam.

After you've installed the hardware and configured the system, you're ready to fire up the gateway. With the network running, you must log on from the gateway server and load the gateway software onto the gateway PC. Finally, you load the 3270 emulation programs onto the user PCs, and the gateway becomes fully active.

From there, you can start a 3270 session (or several sessions, if you've been assigned multiple-session capabilities); you can also log off to run stand-alone PC applications, or with one keystroke, put the 3270 session on hold and toggle to network applications. Since the 3270 session remains active in memory, you can return to it whenever you wish.
—R. A.

you must configure the gateway server. After you've installed the communications board and connected the gateway server to the network and modem, you can sit down at any networked PC, call up the configuration program, and assign the gateway server its *logical unit* and *physical unit* relationships, as well as user access rights, just as you would when installing any other piece of hardware on the network (see the sidebar "Choosing and Using a Gateway"). However, you must consider logistical limitations and performance quirks when configuring the gateway. For example, the gateway cannot bypass mainframe security; the mainframe system manager continues to govern log-ons and authorized access to mainframe applications and files. If the gateway is incorrectly configured, users may not be able to transfer files from the mainframe or even initiate an emulation session; you must then reconfigure the gateway server and perhaps tinker with the network configuration as well.

How a gateway measures up to stand-alone terminal emulation—and how it affects overall network throughput—is less clear. Although the dedicated gateway and the gateway server can communicate with the mainframe at the mainframe's 56K-bps transmission rate, the LAN gateway may be hamstrung by the speed of the modem used to transfer the data to the mainframe. Modem speeds can range from 300 bps to 56K bps. The time required to access a file increases proportionately with the number of users placing demands on the gateway server.

Access time generally slows when you transmit data over telephone lines, but because a gateway

uses only one modem line, it represents a communications bottleneck. Gateway access times are certainly acceptable at 2400 or even 1200 bps on an active gateway server; users can retrieve or send a file from the mainframe at a rate comparable to dedicated 3270 performance.

Access time degrades further if your network operating system forces the gateway server to pass data through a file server before transferring it to either a PC emulating a terminal or the mainframe. While most LAN operating systems work this way, gateway server products are now beginning to offer a node-to-node capability that lets the gateway send the data directly to its destination—with no stopovers at the file server. Another solution to this degradation problem is to increase file buffer size on the network.

Now in Session

Like stand-alone 3270 emulation, gateway terminal emulation software lets you establish a 3270 *session* on a PC—in this case, a networked PC. You can retrieve a file, edit it, and transmit it back to the mainframe or store it at the terminal and send it later—all capabilities conferred by dedicated 3270 terminals.

When comparing gateways and 3270 emulation, avoid confusing the terms *session* and *user*. Gateway software defines a maximum number of concurrent active 3270 sessions. Some packages allow 8, others 16, still others as many as 32 simultaneous sessions, but this does not necessarily mean 8, 16, or 32 users are on the gateway at any one time. Rather, for example, a single user could run three 3270 editing sessions simultaneously on one PC, which, on an eight-session gateway, would leave five sessions available (other user/session combinations would be just as acceptable). When installing the gateway on the network, you can establish each user's right to call up multiple sessions, give specific users priority over others, and give an individual the right to view and edit files. By specifying these options, you can establish specific priority levels for gateway users, just as with dedicated 3270 terminals.

Because all data from the network is passed to the mainframe over a single modem line, the mainframe treats the entire network as one peripheral.

Fair Taxation

You can guard against overtaxing the gateway server by monitoring its daily usage within your work group. What kinds of tasks does the staff perform? Are the tasks repetitive, involving the same data base (such as updating billing records)? Note how often each staff member needs access to records and how long each works with particular records. Once you've established usage patterns, opt for a gateway system that accommodates your current needs and can grow with you.

A clerk in a university records department, for example, may need to confirm students' enrollment status by using a data base of enrollment applications and transcripts; the same clerk may also need access to a data base of every student's current classes to determine class load and appropriate billing. Each clerk who performs varied duties throughout the day needs the ability to establish several sessions at once and must have priority access to available 3270 emulation sessions.

Most manufacturers claim their gateways ideally support 16 active sessions, although some can reportedly accommodate as many as 32 sessions. If you need more than 16 sessions, or if the activity on the 16-session gateway is heavy, you have three possible methods of controlling gateway traffic. First, you can install a second network and gateway—a costly alternative because you must duplicate everything: PCs, network hardware and software, gateway hardware and software, modem, and mainframe port. A less expensive yet effective alternative is to install a second gateway server on the existing network while retaining only one modem line to the mainframe, thus splitting the communications trafficking burden of the existing network between the two gateway servers. This solution is

effective only if the speed of the modem is capable of supporting two gateways; otherwise, a second modem is needed. Finally, you can dedicate the gateway server strictly to gateway functions, thereby freeing processing time for communications tasks. You remove the display and the keyboard, leaving only the system unit on the network.

Power Tool

While a gateway is only one of several means of achieving 3270 emulation, it is by far the most economical and efficient means of connecting a LAN to the mainframe. Aside from cost, perhaps the gateway's most attractive advantage is its ability to run on any type of LAN configuration. While you might expect topology to be a determining factor in choosing a gateway, don't underestimate the importance of how your LAN is used. The prerequisites for efficient gateway use—a working LAN serving relatively few users with moderate demands for mainframe access—should be your primary consideration.

Finally, keep in mind that a gateway is not a simple solution, although it is certainly an economical one. And, although you won't be burdened with extensive hardware installation, you will find that the responsibility of correctly configuring the system falls squarely on your shoulders. Once it is properly installed and configured, however, a gateway can add the mightiest resource of all—the mainframe—to your local area network and give your LAN truly global connections.

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3+3270
3Com Corp.
1365 Shorebird Way
P.O. Box 7390
Mountain View, CA 94039
415/961-9602
List price: 32 LUs $1695
Requirements: 640K, one disk drive (gateway PC); 320K, one disk drive, DOS 2.00 or later version, 3Server LAN board and software (user PC); Ethernet cabling, EtherLink boards on all PCs

AST-SNA/BSC Gateway
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92714
714/863-1333
List price: 8 LUs $895, 16 LUs $1295
Requirements: 256K, one disk drive, AST Communications Card (gateway PC); 186K, one disk drive, AST LAN board, DOS 2.00 or later version (user PC)

CS/1-SNA
Bridge Communications, Inc.
1345 Shorebird Way
Mountain View, CA 94043
415/969-4400
List price: hardware $10,500, software $1000
Requirements: 384K, one disk drive, DOS 2.00 or later version, EtherLink board, EtherTerm software

netPath
Pathway Design, Inc.
One Apple Hill
P.O. Box 8179
Natick, MA 01760
617/237-7722
List price: 8 LUs $2595, 16 LUs $3595, 32 LUs $4595
Requirements: 256K, one disk drive, DOS 2.00 or later version, Novell Netware or Advanced Netware software (gateway PC and user PC); Pathway Intelligent Communications adapter, Pathway adapter cable, asynchronous modem, Novell Netware-compatible LAN (gateway PC only)

Gary Hendonis

Are Corporate PCs Earning Their Keep?

Many companies have sunk millions into PCs without having a coherent strategy. To help gauge the returns on these haphazard investments, corporate America is launching new efforts to determine the cost-effectiveness of personal computing.

Susan Bryant

Conventional wisdom holds that the personal computer has revolutionized the practice of financial analysis and accounting. True or not, no one denies that the PC is a powerful tool in the hands of accountants.

But can the PC account for itself?

The question bears serious consideration, as some companies are now discovering. Almost overnight, PCs have emerged by the millions in American businesses, largely behind the collective back of cost-conscious data processing departments. Today billions of dollars' worth of PCs populate corporate desk tops as, here and there, brave managers risk the wrath of PC users by asking some very businesslike questions: Where did they all come from? What are they doing here? And most vexing: Are they paying their way?

This last question should be an obvious one for any business that has made a sizable investment in personal computing. After all, calculating return on

Plumbing the Corporate Pipeline

Anita Amirrezvani

Managers across the country are beginning to probe the bottom-line benefits of PC use.

To explore the current and potential effects of information technology in the workplace, the Massachusetts Institute of Technology (MIT) has embarked on a five-year, $5 million research program called Management in the 1990s. Funded by ten corporate and institutional sponsors—American Express, Arthur Young & Company, BellSouth, British Petroleum, Digital Equipment Corporation, Eastman Kodak, General Motors, International Computers, MCI Communications, and the IRS—the program consists of 18 research projects conducted by MIT's Sloan School of Management. Program director and MIT professor Michael Scott Morton stresses that the purpose of the research is not to predict the future of information technology, but to "come up with empirical data on the changes we're beginning to see in organizations."

Twenty MIT faculty members from disciplines such as applied economics, organizational psychology, and the management sciences will bring their expertise to areas of research developed jointly by MIT and the program's sponsors. To make sure the research is grounded in reality, the faculty members are working closely with corporate managers and performing fieldwork in diverse organizations. Some sample project topics: How do PCs affect communication patterns and productivity? What's the impact of computer technology on the way we work? How can expert systems be used to manage messages received through electronic mail? How can multinational corporations use information technology to enhance their global presence?

The only research project completed so far has produced some sobering results. MIT researcher Gary Loveman performed an econometric analysis of office automation expenditures in 60 firms for the years 1979 through 1982. He found that the productivity of each extra dollar invested in office automation (as measured in sales) compared poorly with that of other types of capital investment. Although numerous theories could explain this, Loveman cites the tendency to buy too many computers as a likely culprit. Or it could simply be that current uses of PCs don't always contribute markedly to productivity.

The recent explosion of information technology has loosed a Pandora's box of questions about how computers and electronic communications can be used effectively in the workplace. By combining the research techniques of academia with the practical experience of managers, the architects of the MIT program hope to build a solid foundation for answering the knottiest questions of the information age.

Anita Amirrezvani is a freelance writer based in Berkeley, California.

investment (ROI) is a fundamental business practice—in fact, it's routinely performed on a PC. But until recently the question itself was only slightly more obscure than the answer.

John Seymore, president of Information Center Sciences, a New York-based consulting firm, summarizes the dilemma: "The problem is the sudden proliferation of personal computers. In most large corporations, any new item cheap enough to be hidden in the miscellaneous category of departmental budgets can cause a bulge of more than a few million dollars before the red flag goes up. The PC's red flag went up within the past two years."

Audit the Yellow Brick Road

Because companies often neglect controls when they initially purchase and install personal computers, a methodology to measure the benefits that PCs have wrought remains elusive. The first step on the road to reckoning is to establish sound procedures for tracking PC use, a skill many corporations are still learning. Currently the most common controls are chargebacks—which transfer the fiscal responsibility for PCs back to departments or clients—and audits, on either a systematized or an informal basis.

But even with hard-and-fast figures delineating expenses, there's still no surefire way to evaluate PC productivity, partly because of the imposing number (and the inherently subjective nature) of variables involved. The cost of developing accurate ways to measure the intangible benefits of increased precision in financial analysis, or for that matter, the effect of a slick newsletter produced with a desktop publishing system, may offset the advantages the machines provide.

Until a scientific method of appraising the overall effects of PCs emerges, management is employing elementary work output measures to quantify the impact of PCs on specific tasks and departments. By coupling these indicators with a detailed assessment of costs, companies can now have a general sense of what they're getting for their money (see the sidebar "Plumbing the Corporate Pipeline").

Closing the Barn Door

For some companies, the push to rationalize PC use is inspired by economic dire straits. Until recently, disarray best described the predicament at American Motors Corporation (AMC) in Southfield, Michigan, where a hiatus has been called on PC procurement. Throughout American Motors, PCs toil at the usual analysis, forecasting, and word processing tasks. As

Until a scientific method of appraising the overall effects of PCs emerges, management is employing elementary work output measures to quantify the impact of PCs on specific tasks and departments.

part of its attempt to move back into the black after sustaining severe losses, the nation's fourth-largest automaker is treating PC proliferation as one symptom of bigger troubles. AMC is employing a number of techniques to combat inefficiencies in PC acquisition and use.

To begin with, no additional PCs will be allowed into organizational units at AMC until central control is firmly in place—an edict top management mandated in April 1985. The centerpiece of AMC's plan is a cost-control innovation known internally as the "end-user planning worksheet," a questionnaire that asks potential PC users to justify their hardware requests.

The worksheet is designed in part to determine the volume of data the new PC will process, and whether that data will be keyed in from reports or downloaded from a mainframe or an on-line service. The questionnaire is especially tough in the area of cost justification, posing such queries as: What monthly dollar savings will the new computer provide? Will savings accrue in overtime costs, temporary personnel, or permanent personnel? Can the PC eliminate some outside time-sharing? Will the PC reduce other expenses, such as graphic arts services,

special equipment, or special forms? From what budgetary line item will funds for equipment be derived?

The information AMC management gleans from the worksheet helps resolve such basic issues as the relative merits of PCs versus mainframe terminals. According to Bob Moscowitz, AMC's supervisor of desktop computing, "This is a starting point that helps us figure out what our return on investment will be and when we can expect the payback." For now, AMC is operating with a clean slate; Moscowitz is content to let questionnaire results shape both the company's timetable on ROI and its expectations of what that return will look like.

Costing by Charge-Back

AMC's cost-control campaign extends to the recent introduction of a charge-back system for PCs. Charge-backs tend to provoke political wrangling, primarily because they're often perceived as an attempt to dun specific departments for corporatewide costs. Whatever their effects on organizations, charge-backs are still somewhat crude measurements of costs rather than precise productivity indicators. Like questionnaires, charge-backs indicate who's using PCs for what, and they supply a fairly reliable means of tracking PC-related expenditures and activities.

There are essentially two forms of charge-backs: those in which an organization assesses its departments' technology use (including costs of hardware, software, support, training, and maintenance); and external charge-backs, in which the corporation recoups the costs of technology by passing those costs on to its customers.

At AMC, where PC purchases are line items in departmental budgets, the management information systems (MIS) unit assesses individual departments for servicing, technical support, and training.

External charge-backs are the rule at the Reading, Pennsylvania, engineering firm of Gilbert/Commonwealth, where, according to information processing manager Barry Pierce, the charge-back *is* the cost justification. Gilbert/Commonwealth bills its clients $15 per hour for PC use, thereby covering the company's costs. Says Pierce, "Now the criterion for getting additional personal computers is that if a machine can generate more revenue than it costs, we get it."

That approach is new at Gilbert/Commonwealth, which today regards the ability to bill machine use to a client as the cleanest path to cost justification. The company also uses internal charge-backs. Departments pay at a rate levied by the corporate leasing center, which acquires the hardware. The internal assessment includes the costs of networks, file servers, communications services, and leased phone lines. "All departments feel they're overcharged," admits Pierce, who suggests that declining hardware prices will eventually be reflected in reduced internal charges.

Charge-backs tend to provoke political wrangling, primarily because they're often perceived as an attempt to dun specific departments for corporatewide costs.

For Gilbert/Commonwealth's MIS department, the charge-back system delivers necessary information on PC use, laying the groundwork for determining subsequent PC expenditures.

Accountability by Audit

Corporations are likewise applying the brakes to runaway personal computing costs through formal and informal audits. According to Tom Samson, a partner at the accounting firm Arthur Young & Company, audits are a way of "rushing into the future by staring at the past."

In a formal audit, auditors probe the accuracy and completeness of a department's statistical records and recording procedures. The audit seeks to confirm that the express purpose of an acquisition or a procedure is being fulfilled.

Peat, Marwick, Mitchell & Co. in San Francisco recently embarked on a three-year study of the 5000 Macintoshes it acquired for field audits. Says audit partner Dick Webb, "We're approaching this analysis from as many angles as we can, in an effort to determine what measurement is best."

The firm acknowledges that certain assumptions underlie the study, among them the expectation that the machines will change Peat Marwick's business in significant ways. Like AMC, Peat Marwick will rely on questionnaires to verify the number of Macs in use, the kinds of additional software that work groups have acquired, the aggregate hard out-of-pocket costs, and the effectiveness of in-house training. The firm will examine as many as 1000 audit engagements to determine how each went with the Mac in tow. Finally, Peat Marwick will convene a series of focus groups to further examine the effectiveness of PC use.

Formal auditing is also in progress at Litton Data Systems of Los Angeles. At Litton, the audit department tabulates machine use in hours and classifies that use by job and department. According to James Fortney, chairman of the company's data processing committee, low use is apt to prompt further inquiries: Has the task for which the machine was originally acquired disappeared? Did a skilled user leave the company? Is the low-use pattern a result of not having acquired the right tool for the job?

In many organizations audits are less formal—but no less helpful. At the cosmetics house of Avon, the audit department evaluates PCs during regularly scheduled departmental reviews. Auditors make suggestions to increase PC efficiency, occasionally recommending new software and diagnosing training needs and deficiencies. Says John Hart, Avon's manager of office systems, "The feedback comes from a variety of vantage points. For example, some of our MIS managers are separately responsible for finance, marketing, and manufacturing—and all are in routine contact with our PC users. They know exactly what's going on."

User groups have also become a major source of informal PC auditing for companies such as Bergen Brunswig, a wholesale pharmaceuticals firm in Los Angeles. Feedback from user groups inside and outside the company is furnished to internal auditors, who can then determine exactly how PCs are being used. Is an official presence at group meetings an intrusive way to obtain information? Not according to employees, who continue to extol user groups—and understand the company's rationale in tracking their activities.

Excessive Control

It's axiomatic that PCs are inherently difficult to control. While some corporations are committed to tracking usage via such vehicles as audits and chargebacks, other firms adhere to a laissez-faire approach, convinced that that is the only way to reap the benefits of a nascent—and relatively inexpensive—technology.

Says a contrarian at one corporation, "We actually discourage anyone from doing cost/benefit analyses of PC use. We want our employees to acquire PCs and get familiar with using them. PCs will play a strategic role during the next ten years, and acquiring them now represents an investment in our future. If you say you need a PC to do your job, we don't worry if you're right or wrong—just go get it. The benefits so greatly outweigh the problems—including the cost—that any other attitude is senseless."

Corporations are applying the brakes to runaway personal computing costs through formal and informal audits.

Even at Litton, which has opted for formal audits, the corporate culture discourages a penny-wise, pound-foolish view. As James Fortney puts it, "If PCs are tools for employees, then what we're dealing with is an investment in individuals so they can better do their jobs. The amount of money we spend on PCs and software is relatively small."

Indeed, companies of various persuasions acknowledge that the quest for ROI numbers must be tempered with hard-nosed (that is, financial) realism. Mark Burnham, vice president in charge of PC acquisitions at Security Pacific National Bank in Los

Angeles, is an advocate of prudent cost accounting. "At my previous company, we did all kinds of studying to ensure cost justification," he says. "We finally discovered that we were spending $40,000 in administrative costs to justify $15,000 worth of machines."

The PC Stops Here

At Security Pacific, individual department managers monitor their own budgets and exercise wide latitude on PC policies. The corporation distinguishes means from ends: Managers must answer only for the productivity of their staff members—not for that of their computers. "Managers can choose to spend their money any way they want," Burnham says. "If they spend money on PCs, that's their choice, not the MIS department's."

At Avon, the cost justification burden has also fallen squarely on the shoulders of individual department managers. According to John Hart, "We've come full circle. We used to do detailed cost analyses of every PC, with a firm return on investment and a two-year payback in mind. But no more. Now it's up to department management. If an employee can write a request and management thinks he or she should have a computer, the person will get it."

Hart feels this midcourse change has generated "a great deal more user satisfaction." Keeping corporate users happy is important as organizations sift through various approaches to harnessing the costs of PC power—without hindering productivity.

At AMC, refinements to the cost/benefit calculus are ongoing. Says Bob Moscowitz, "We still have some misplaced equipment, which we're doing our best to move around. One area might have 6 PCs and want 6 more, but what they really need are 15 terminals. Mistakes in equipment selection are a major cost concern. Right now, this is a squeaky-wheel business, and a lot of companies are still trying to get the necessary grease."

Appraising the Benefits

The most difficult part of any cost/benefit analysis may be quantifying the benefits side of the equation. How can you measure what you don't know? One way, according to Avon's Hart, is to extrapolate as many cost factors as possible.

"If you're paying a daily courier service to do what you could do electronically for far less, you're eventually talking the price of a PC," Hart says. "The same is true if you're repeatedly missing schedules, incurring penalties in filing papers late, or losing patent rights because you failed to seek a renewal. Past performance carries a price tag—it's a hard dollar figure that affects the bottom line."

Other benefits accrue with more subtlety but are no less critical, even if they cannot be translated into dollars. Peat Marwick found its widely publicized Macintosh acquisition paying big dividends in prestige. Consequently, the firm has become increasingly successful in hiring top students right out of school, a strength Dick Webb claims is "vital to our business. We're now perceived as leaders."

Companies of various persuasions acknowledge that the quest for ROI numbers must be tempered with hard-nosed (that is, financial) realism.

A Productivity Benchmark

But perhaps the most important benefit (and until recently the most resistant to quantification) is the Holy Grail of modern management: improved productivity.

Gilbert/Commonwealth is trumpeting its success in measuring the benefits of automation, especially worker productivity. The firm conducted extensive studies to determine productivity gains among its engineers. Barry Pierce says the findings indicate that providing an engineer with even a few hours of PC time per week can yield a 10 to 15 percent improvement in overall productivity.

Gilbert/Commonwealth developed its measures by targeting jobs appropriate for automation, then querying employees on how various tasks were performed in the absence of PCs. Staff members dutifully recorded methodologies and procedures. The company then performed a series of time studies on manual task completion and charted the results.

Management followed up by proposing methodologies that took PCs into account. Employees duplicated the time studies with hardware and software in place. "Obtaining results was obvious and straightforward," says Pierce. "It's just that companies seldom bother to do this kind of analysis."

After completing the exercise, the company found a 50 to 70 percent reduction in the time needed for certain tasks and up to a 50 percent reduction in work hours for various jobs. Balancing these figures with the amount of time engineers spent performing tasks unrelated to automation, Gilbert/Commonwealth emerged with its productivity measure.

Even this tangible, if modest, measure doesn't mean the firm has recouped its $2 million PC investment. Pierce describes the company's Xerox Stars, dedicated to engineering applications, as "cumulatively profitable—their lease cost has been exceeded by their revenues." Still, machines assigned to support and nonengineering areas (where revenue cannot be recovered as easily) have yet to move into the black. Gilbert/Commonwealth is not, however, writing off PCs housed in company cost centers. "We expect to make back our investment before the equipment is fully depreciated," Pierce says.

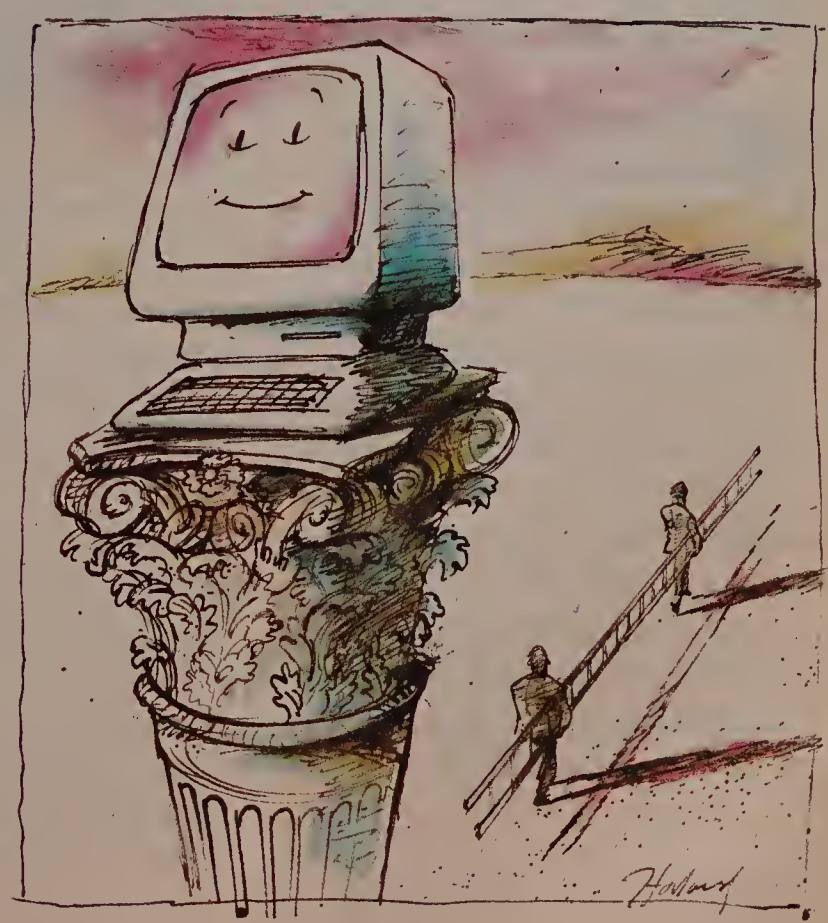
A Rising Tide

Gilbert/Commonwealth is just one firm among a constellation of corporations that have begun to obtain a fix on both the costs and the benefits of PC use. PC policies tend to mirror the overall corporate culture, varying from great freedom to tight control. In some organizations audits are viewed as overkill. In others a tradition of laxity is yielding to scrutiny of how technology is actually being used, and audits are a first step. On still other fronts charge-back systems are forcing accountability in PC procurement and use.

Less clear is whether PCs are enjoying protected status in companies experiencing economic hard times. Such firms form the front lines of the ROI campaign; they plainly have ample incentive to determine whether PCs are earning their keep. Corporations in a belt-tightening mode may demonstrate that PCs keep personnel costs down—or that they are largely new-age frills with an uncertain payoff, to be jettisoned at the first dip in the bottom line.

As the use of personal computers matures, organizations are maturing technologically as well. Corporations increasingly understand (and articulate) the impact of PCs on their operations. The time for assessment has arrived.

Susan Bryant is a freelance writer in Morgan Hill, California.



Sideline Software

For an increasing number of forward-looking corporations, serving customers means developing software—and software means potential profits where once there were none.

Rebecca Bruns and Irene Fuerst

Remember when commercial establishments brandished irksome signs like, "The Bank of Perpetual Security doesn't sell hot dogs, and Frank's Hot Dogs doesn't cash checks"?

Frank's Hot Dogs is probably still shrugging off the banker's role, but in a contemporary twist on the old saw, the Bank of Perpetual Security may well be doing a brisk business in PC software. Although you're not likely to see people lining up to buy programs at your local bank, some PC users are purchasing software from an unexpected quarter—companies (including banks) that developed programs, often for their own needs, and subsequently decided to sell them on the open market.

Favoring the adage, It takes one to know one, these firms are betting that users will give more credence to programs written by industry insiders than by software vendors. The corporate-user-as-software-vendor phenomenon is proving a compelling sideshow in the software business, and it appears to be whetting the appetites of clients in quest of ever more exacting software solutions.

Slowly but certainly, companies and users at large are detouring from the traditional software path. They're trying out the more demanding, often more costly, products from firms that ostensibly have little or nothing to do with computers but that have successfully translated corporate intelligence into useful applications. Regardless of whether in-house programs on the whole favor the promotional over the productive, users are benefiting.

Corporations moving programs in volume tend to be service-oriented operations that rely on software almost as a loss leader, a way of keeping existing clients happy or attracting new ones (see "PCs Insure Success," *PCW*, June 1985). Among the more prolific in-house developers are concerns engaged in financial services: Big Eight accounting firms like Arthur Andersen & Company and Arthur Young; major money-center banks like Citibank and Irving Trust; and insurance companies like Metropolitan Life. Management consulting houses such as Arthur D. Little have likewise entered the business. Other big PC users—industrial, manufacturing, and telecommunications companies from Boeing to Pacific Bell—have found that the programs that solve their own operational riddles also prove useful to companies with similar needs. Still others have jumped feetfirst into the software business by purchasing existing software houses.

Judy Laume

Jon Matsuo (right), point man for DH&S's PlusPlan, walks users Dianne Lucien and Bryan Pirrmann through the Big Eight firm's program.

At its most ambitious, this backdoor route into the software game is enabling corporate titans to offer increasingly esoteric vertical market (that is, job-specific) packages. Typical is Peat Marwick Mitchell & Company's *Micro-AIM$*, which comprises a total financial management system for small to medium-size airports.

Accounting From Scratch

The genesis of *PlusPlan*, an auditing package developed by another Big Eight accounting firm, Deloitte Haskins & Sells (DH&S), exemplifies the homegrown software phenomenon. In the 1970s a junior accountant at DH&S's Los Angeles office, weary of crunching numbers by hand, called upon his accounting expertise and rudimentary programming skills in FORTRAN to devise a mainframe-based auditing program. He dubbed the package Falcon (for "financial consolidation"), and DH&S quickly put it to work. Clients who observed the program's capabilities came away impressed, requesting copies to help simplify their own monthly audits. The firm obliged.

At the urging of those clients, DH&S eventually expanded the program. Falcon became Falcon/Forecast, a powerful time-sharing program that, in its prime, had a home in some 300 multinational firms.

In 1983, with time-sharing costs still high, the London DH&S office hatched a PC version of Falcon/Forecast written in compiled BASIC. Called *PlusPlan*, the PC incarnation duplicated the mainframe success—and then some (see Screen 1).

"We knew *PlusPlan* would save our clients a lot of money," says Jon Matsuo, national coordinator for *PlusPlan*. "We also knew it would attract new clients who couldn't afford Falcon/Forecast."

The program—one of ten in-house DH&S packages available commercially—is sold primarily on a "foot-in-the-door" basis, easing the way for the sale of other company services. "We're principally trying to sell the evidence that we know our business," says Bruce Johnson, manager of the firm's computer resource center.

What DH&S didn't immediately realize was *PlusPlan*'s marketability. At $695, *PlusPlan* has been so well received—with more than 1200 users worldwide to date—that DH&S recently began investigating sale of the program through retail outlets. "One distributor felt he could sell 100 copies a month in California alone," says Matsuo. Just this May, Time-Value Software, a distributor of software to the financial community, added *PlusPlan* to its stable of programs for CPAs, controllers, and attorneys.

Homegrown, Sweet Homegrown

The stimulus for mainline businesses to dabble in—and then market—software harkens back to the early sixties, well before the marriage of *personal* and *computer*. "What you've got here is not terribly new," explains Dave Sturtevant, spokesperson for ADAPSO (Association of Data Processing Services Organizations), the software industry's chief trade group. "In the history of business, companies occasionally scan the horizon and say, 'We need a program that does XYZ PDQ.'" After developing the program for internal use, says Sturtevant, "Some smart guy says, 'I bet a lot of other people need a program that does XYZ PDQ.'"

The current trend points up a historical distinction between software developers and software publishers. Because writing a mainframe program is tremendously expensive, the programming has often been the domain of universities and Fortune 500 firms; once programming is completed the software publisher begins turning the program into a product. Cullinet Software, for example, purchased a mainframe data manager called IDMS (Integrated Data Management System). from B.F. Goodrich in 1973. Reworked a number of times, IDMS is today one of Cullinet's flagship products.

"The trend to resell PC software began with the second person to program a microprocessor," contends consultant Frederic Withington of Arthur D. Little. "The size of the computer doesn't make any difference."

Even so, hard data on this trend—and aggregate dollar figures—remains elusive. That's partly because corporate data processing departments are traditionally considered cost centers rather than profit centers. "There's no available information on the dollar value of internally created software because companies themselves lack that data," explains Paul Cubbage, a senior industry analyst for Dataquest, a market research firm based in San Jose.

"We're not like Lotus or Multimate—we can't cite development costs and sales rates, then quantify profits," DH&S's Matsuo explains.

```
No. Cl Account name       Subtotalling logic                    Keyword
---- -- ----------------  ----------------------------------    -------
  1 CR:SALES
  2   'Cost of Sales:
  3 DR:  Materials
  4 DR:  Labor
  5 DR:  Overhead
  6 DR:  Total            =3 thru 5
  7 CR:Gross Margin       =1 + 6
  8   'Operating Exp:
  9 DR:  Marketing
 10 DR:  R and D
 11 DR:  G and A
 12 DR:  Depr
 13 DR:  Total            =9 thru 12
 14 CR:Income(Loss) Op    =7 + 13
 15   '
 16 DR:Interest Exp.
 17 CR:Interest Inc.
 18 CR:Exchange G or L
 19 CR:Inc before tax     =14 + 16 thru 18
 20 DR:Tax expense

      Press cursor keys to scroll display, 'ESCAPE' to return to menu ?_
```

Screen 1: The account definition component of PlusPlan, an auditing package from Deloitte Haskins & Sells, uses a variation on the spreadsheet metaphor and includes as defaults a lengthy list of account names—more than 80 in all.

Sharpening the Edge

In addition to serving as client bait, in-house software can offer a developer the promise of a competitive edge. Several years ago, Bank of America designed a PC-based cash management system expressly for its corporate clients, becoming one of the nation's first banks to do so. Unlike *PlusPlan,* which emerged quietly in response to user demand, BofA's *MicroStar* was attended by marketing fanfare and a major investment in customer education. "We saw the cash management system as an opportunity to differentiate ourselves in the marketplace," says Richard Anderson, BofA vice president of automated treasury services. *MicroStar* has also paved the way for further in-house software ingenuity: In the pipeline is a treasury program for small businesses, a program Anderson calls "a mini-cash-management service." *MicroStar,* meanwhile, "has been a role model within the bank for entrepreneurial behavior."

The program itself accelerates and simplifies the cash management process dramatically (see Screens 2 and 3). BofA counts more than 500 *MicroStar* users worldwide and claims demand is unflagging. *MicroStar*'s guises vary from the $295 job (a simple communications package) to a comprehensive $20,000 cash management opus. Considering that some corporate cash managers have been paying as much as $40,000 a year in time-sharing costs for similar mainframe programs, *MicroStar* can be a bargain.

Edward Klamm

For Alumax's George Erving (left)—assisted by Abdul Premji of BofA—MicroStar whittles cash management to manageable size.

A team of ten bank programmers, product managers, and marketing experts devised the *MicroStar* prototype. BofA went outside only to purchase spreadsheet and debt investment modules from ADS Associations, a leading independent treasury system vendor.

Other companies, heartened by BofA's example and sniffing profits in the still-fecund PC business software market, are moving in. Aircraft manufacturer McDonnell Douglas recently established an autonomous division to investigate, develop, and market CAD/CAM (computer-aided design/computer-aided manufacturing) software for the PC marketplace, using its mainframe Unigraphics I package as a foundation. Its Communications Industry Systems subsidiary, meanwhile, recently unveiled *MicroCube,* a three-dimensional spreadsheet. Another aerospace giant, Martin Marietta, went so far as to purchase two software houses—Mathematica and Oxford Software—and merge them with its existing software division. Martin Marietta Data Systems' slick ten-product *IT* productivity series, the offspring of that consolidation, covers business turf from graphics to a multidimensional spreadsheet.

Goodwill or Good Business

Homegrown software is not purely a profit-making endeavor. Most companies continue to regard their software packages as door openers rather than wellsprings of profit. Increasingly, corporate software is becoming a service in itself and a means of cross-selling other company goods and services.

"First and foremost we're developing products because our clients need them," Matsuo says. "Certainly the service component is first. We don't make that much on software sales per se—we profit

from developing a relationship with the clients as a result of selling them the product."

Even at Price Waterhouse, a Big Eight firm that has mobilized an entire division to develop tax-related PC software, the program's not entirely the thing. "Most of our software is aimed at selling our clients a service rather than selling the software itself," reports Dhiren Rao, senior manager of management consulting services in Price Waterhouse's San Francisco office. The company's software resources are managed by a group known as Corporate CATS (Computer-Assisted Tax Services).

Other factors are at work as well. Corporations generally perceive their vertical products as contributing to a kind of fraternal market—business providing for business. They point out that their strength as software developers springs from an insider's understanding of its own industry.

"We can bring to a problem a variety of tax, accounting, computer, and other financial skills. [Outside of an accounting firm,] it's difficult to marshall all these skills in one place," Rao suggests. At Price Waterhouse manifestations of those skills include *CorPlan*, a corporate tax analysis package, and *International Tax Management System*, a program designed for corporations with global units.

Indeed, in Matsuo's view, the very fact that professional auditors conceived and wrote a package is in itself reason for some clients to pay the product special notice. "A software house could have produced *PlusPlan*," he says, "but because we did it, people are more likely to buy it. The program thinks like an accountant." Matsuo explains that *PlusPlan* users are attracted by the program's ability to handle complex consolidations and overseas subsidiaries—sophisticated features that commercial software houses are not likely to engineer into off-the-shelf programs. Even vertical accounting applications that boast similar features don't wear a Big Eight logo—and thus lack what Matsuo suggests is DH&S's almost-instant credibility.

"The DH&S program is written *by* accountants *for* accountants," affirms Mary Kummer, manager of corporate finance at Wavetek Corporation, a manufacturing firm that entrusts its accounts to *PlusPlan*. "We would have had to customize an off-the-shelf program, but *PlusPlan* has the tightness and report-generating features we wanted."

To corporate users, a specialized in-house program can represent substantial savings in time and money. *MicroStar* user George Erving, cash manager of Alumax, a San Mateo, California, aluminum manufacturer, notes that BofA's program "increases the sophistication of everything we do," he says. Before Erving arrives at work each morning, the package faithfully dials up the mainframes of the banks where Alumax does business and begins feeding data to *MicroStar*. The program also tracks balances and transactions and consolidates all information into a single spreadsheet—a virtually instantaneous snapshot that the company regards as vital for timely investment decisions.

The lure of potential savings induced Jerry Noesen of Northrop Corporation to switch from a mainframe product to *CorPlan*. Although he admits the PC version is a bit sluggish compared to its mainframe counterpart, "It has

```
BR BASE          EC ECUIBOR       LR LIBOR         SW SWAP RATE
CB CB RATE       FF FED FUNDS     LM LIMID         AA AAA RATE
CD CD ISSUE      GS GOVT SET      PR PRIME         OA OTHER A
CP CP ISSUE      HK HKIBOR        SD SIBID         OB OTHER B
DI DISCOUNT      JL JLTP          SR SIBOR         OC OTHER C
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LOAN REFERENCE : SY11      6 YR SYNDICATED        CURRENCIES AND RATES

CURRENCY 1     : US DOLLARS
                                 OR BASIC RATE        : PRIME
BASIC RATE         : LIBOR          SPREAD (%)         : 1%
SPREAD (%)         : 1%             RESERVES, Y/N      : YES
RESERVES, Y/N      : NO             BASIS, 365/360/30  : 365 DAYS
BASIS, 365/360/30  : 365 DAYS
                                 VALID FROM : 4/14/1986
WHICH RATE, H/L/A : -                   TO : 12/29/1988

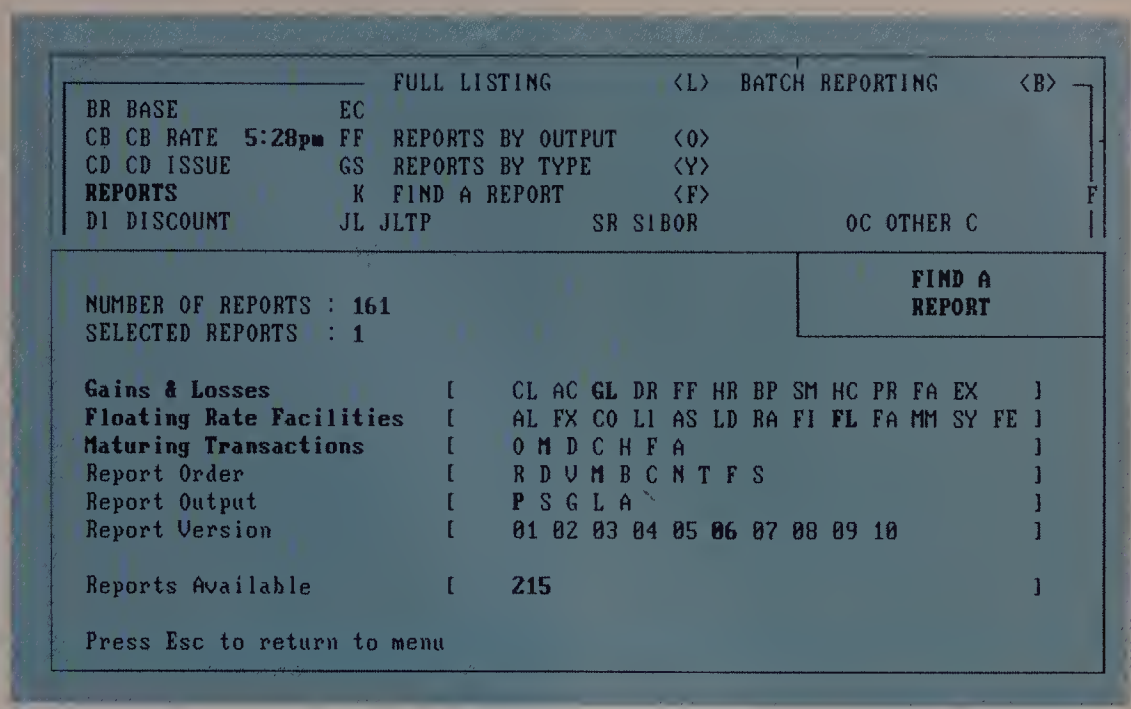
IS THIS CORRECT, Y/N ?
```

Screen 2: MicroStar's Term Debt Manager module enables debt portfolio managers to define loan amounts in various currencies and at various rates. A pop-up menu listing available codes is just a keystroke away.

enabled us to run countless complex scenarios that calculate taxable income and auditing outcomes covering 10 to 12 years at a time. Without *CorPlan,* we'd go through more estimating and manual computations."

But whether users regard banking software bearing BofA's or Citibank's imprimatur as superior to banking software from the local VAR (value-added reseller) is a matter of debate. "The Citibank name certainly carries some weight," says Laurie Windham, an analyst with the market research firm Future Computing. But just how much weight, Windham cautions, depends upon the developer's presence in the business community.

According to Windham, "It's not a simple issue of name versus name." Instead, buyers look for a developer with as much substance as possible—one that seems able to support the product, however elaborate and impressive its attributes.



Screen 3: The Term Debt Manager's reports definition screen enumerates up to 55 report characteristics that help users winnow pertinent reports.

The Mystique of Marketing

To reach a wide audience and acquire additional software expertise, some companies temporarily join forces with computer professionals to create the in-house programs they need. The classic example is Connecticut Mutual Life, which commissioned an outside programmer to design a PC word processor with commands mimicking those of the Wang system that its employees knew. The resulting program, *MultiMate,* remains a major business software hit. Although programmer Wilton Jones retained marketing rights to his creation and built a company around it, Ashton-Tate has since scooped up Jones's brainchild (and the company he formerly headed).

Similarly, Metropolitan Life, in a joint venture with Cornell Computer, developed *Lawtrac,* a corporate legal department management program initially intended for use only within the company. Cornell subsequently began marketing and distributing the program commercially, keeping Metropolitan happy with royalties for every copy sold.

With that tactic, Metropolitan sidestepped the steepest barriers to market success for in-house software. Many companies that see internally developed software as a potential profit maker turn to third parties when they discover they aren't set up to handle the necessary marketing and support efforts.

Even corporations with winning programs may stumble as those programs evolve into full-blown products backed by sales and support organizations. Cornell Computer is a case in point. Prior to marketing *Lawtrac,* Cornell's principal business had been custom software development; when the PC marketplace began to boom, the company decided to form a products division to add muscle to its consulting arm. "It was painful for us—we had to learn a number of marketing techniques," admits Frank Orzo, director of Cornell's software products division.

"People don't just buy a bald program," explains Bob Lefkowits, director of software services at Infocorp, a Silicon Valley market research firm. "Training, packaging, support, and documentation are all part of good software." And every part is expensive. "Lotus spends something like 35 percent of its budget on marketing," he says.

BofA ponied up several million dollars before unveiling *MicroStar*. The bulk of that outlay, according to Anderson, went for items other than development. "The big costs have been marketing and support," he says. For BofA, getting the word out meant tickling the mass market with direct mail, sales calls, and telemarketing; keeping the product alive entails training, on-site support, and a telephone hot line.

Not so at DH&S. Until distributors began to send approving signals, the firm mumbled rather than shouted about *PlusPlan*. DH&S opted for word-of-mouth advertising, personal contacts, and modest (though competent) product support.

Still, if organizations can obtain a return on the investment they've made in their own software, they invariably attempt to do so, says ADAPSO's Sturtevant. "More frequently," he says, "those efforts fall flat. These are not software companies. They're not set up that way."

Although his alliance with a corporate vendor was fruitful, Cornell's Orzo essentially agrees: "Corporations give [software] a halfhearted attempt. The first quarter they lose money, someone says, 'Let's get out of this.'"

Matsuo of DH&S insists that service will out and that even as a secondary business, software development can pay. "It's very, very difficult to market software and compete," he says. "The only reason we stay in business is because we develop these relationships. We can't rely on volume sales to turn a profit."

George Steinmetz

Dhiren Rao of Price Waterhouse sees sideline software as a means of underscoring customer service.

In fact, success can spell trouble for some homegrown software ventures. Arthur D. Little, for example, handles software support in-house and isn't interested in anything more ambitious. "If a program were very successful, we'd have to involve outside help," says Withington. "At this point, we're not able or willing to handle the marketing function."

Even full-time software vendors sometimes decline to market a homegrown program. Mammoth Cullinet Software sells several programs developed for internal use, but in a manner that can only be described as desultory. Of one package—the *Cullinet Sales and Marketing System (CSMS)*—spokesperson Bob Hughes says, "If people want it they can buy it, but we won't support it. It's a drain on our resources."

Whither Internal Inspiration?

Whatever the incremental costs, many companies intend to continue producing programs for internal problem solving, commercial sale, or piggybacking onto their existing products. And as long as the market is riddled with vacant niches, enterprising individuals and organizations will inevitably try to fill them.

Whether a program comes off-the-shelf or is the product of a corporate development team, the ultimate test of value is its ability to get the job done. With few exceptions, users of corporate packages like what they see; increasing numbers are confident enough to abandon mainframes in favor of PCs running packages that were once merely byproducts of an internal assignment.

For now, there's enough room at the top for an occasional specialized, in-house package to break through. "The marketplace for general [low-end] applications is becoming saturated," says Steve Mann, PC specialist at Peat Marwick Mitchell. "People now have the tools to build their own turnkey systems. Firms like ours can do so for between $10,000 and $30,000—about the same price as a vertical market package." Freed of the pressures of appealing to a mass market, such in-house programs will continue to take the extra step needed to solve specialized business problems effectively.

Walter Popper, a principal at Index Systems, a Boston, Massachusetts, computer consulting firm, offers what may be the most prescient forecast: "The lasting trend is software that's tied to the company and enhances its existing products."

If he's smart, Frank the Hot Dog King just might reconsider his check-cashing policy. ●

Rebecca Bruns is a freelance business writer based in San Francisco. Irene Fuerst is a former West Coast reporter for Datamation *and now writes on technology from San Francisco.*

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IBM's Road Machine

IBM's long-awaited laptop offers few innovations but even fewer disappointments. The PC Convertible is a sturdy portable with 3½-inch disk drives, exceptional battery life, and an affordable price tag.

Paul Freiberger

The airplane taxied toward the far end of the runway, bumping up and down like a cork on gentle swells, and came to a portentous halt. I opened the attractive, aluminum-gray carrying bag and pulled out IBM's long-awaited entry into the laptop computer market—the PC Convertible.

At first glance the computer doesn't appear spectacular. While it's an attractive machine, were it not for the IBM nameplate, it could easily get lost in the shuffle of other LCD (liquid crystal display) portables. Although the Convertible's unique screen technology is a cut above that of most portables, in the final analysis the display is not much easier to read. However, by avoiding more expensive, power-hungry technologies, such as backlit and gas-plasma displays, IBM has managed to push the Convertible's battery life up to 10 hours and its price down to a competitive $1975.

The really big news, though, is the PC Convertible's dual 3½-inch floppy disk drives. Although the smaller disks are used in other compatible laptops, such as the Data General/One, it took IBM to force major software manufacturers to convert their products to the durable and capacious (720K) 3½-inch disks.

The PC Convertible: In a Clamshell

The Convertible is off-white in color and sports a slender gray handle, which is built in to the lip of the keyboard and slides out to double as a palm rest. The carrying case has a handle and strap, and its pockets accommodate the power supply, peripherals, disks, and the spiral-bound *Guide to Operations*. The whole thing fits under a 737 airplane seat with room to spare.

The Convertible measures 12⅓ inches wide by 14¾ inches long by 2¾ inches high and fits easily on a plane's fold-down meal tray. At just over 12 pounds, the Convertible inhabits the middle range of laptops, weighing slightly more than the new DG/One Model 2 (see *From the Hardware Shelf* in this issue for a review of Data General's latest laptops).

Like most laptops, the PC Convertible is controlled by an 80C88 microprocessor, a 16-bit CMOS chip that draws less power than conventional CPUs. The machine comes with 256K of RAM, expandable only to 512K, not to 640K. The battery automatically recharges when you plug in the external AC/DC power supply. Its 78-key nondetachable keyboard resembles that of the IBM PC, but the layout has been modified to fit the smaller space. The Convertible's flip-up LCD screen displays a full 80 columns by 25 lines at a 640-by-200-pixel resolution. The screen is easily detachable (hence the name Convertible), so you can clip the optional CRT Display Adapter to the back of the unit and plug in a digital, RGB (red-green-blue), or composite monitor. IBM provides two optional monitors: a scaled-down monochrome graphics composite monitor and a normal-size RGB monitor. However, neither the IBM Monochrome Display nor the IBM Enhanced Color Display is compatible with the Convertible.

The Convertible offers other options, such as a clip-on thermal printer, an internal 1200/300-bps modem, and serial and parallel ports. However, these options don't come cheap. A typical setup with DOS and 512K RAM, a printer, a monochrome monitor, a

The PC Convertible's LCD screen can be snapped off and replaced with a special monochrome monitor that juts over the system unit.

display adapter, and a modem would boost the Convertible's cost from $1995 to $3730. Throw in a Serial/Parallel Adapter (not standard with the base model), and you've almost doubled the cost of the original machine (see the sidebar "Optional Equipment" for more on the Convertible's peripherals).

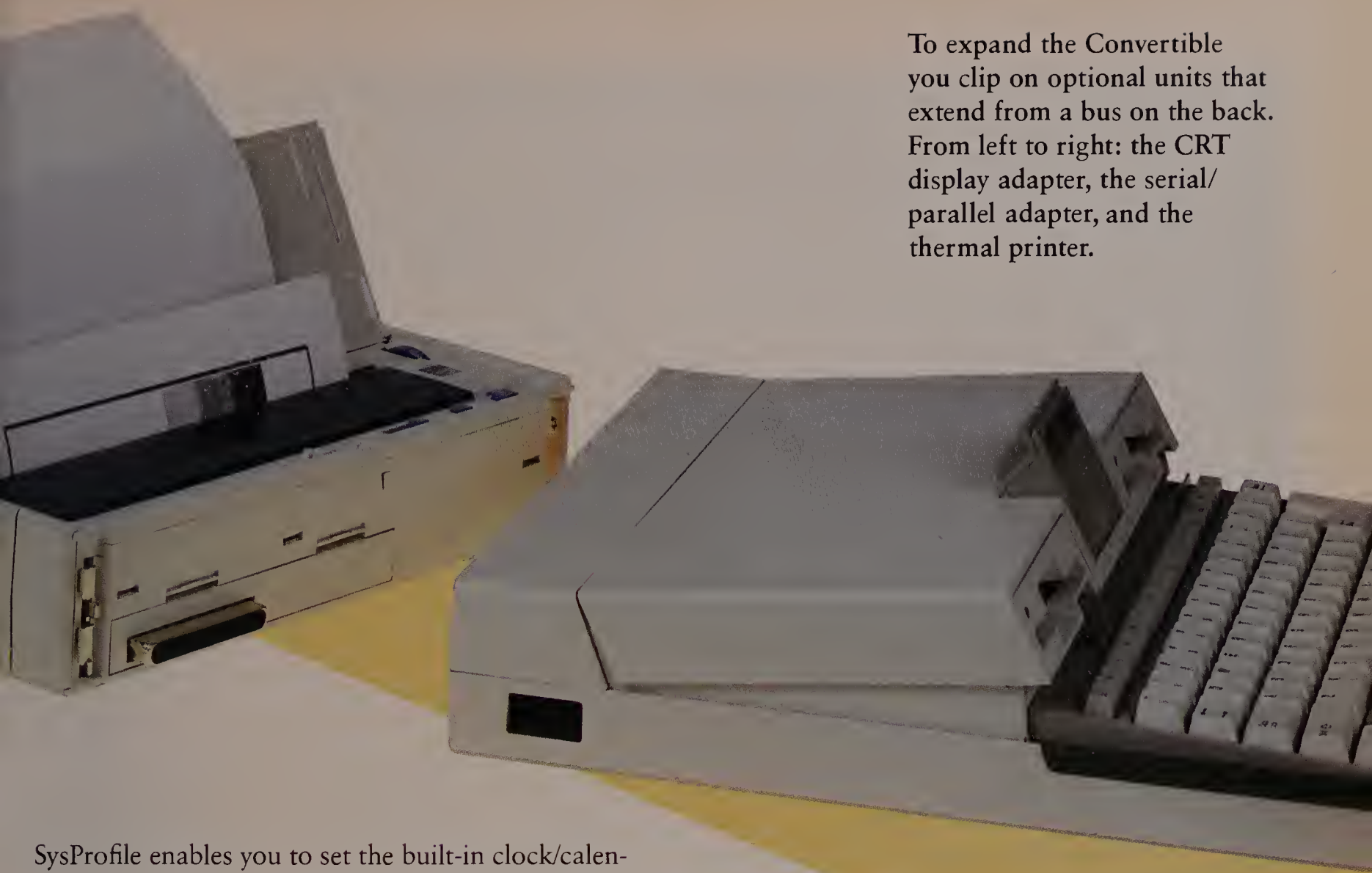
Instant Software

The plane was still on the runway, and the captain mumbled some excuse for the delay, so I went ahead and flipped up the LCD by pressing two buttons located under the handle. I reached around to the red button on the far right and turned the computer on. There was a short, low tone and a beep. The gray screen came to life, displaying a dark gray disk gliding into a disk drive. The computer was hungry for software.

The Convertible comes in two models: base and standard. The base model comes with a diagnostics program only. For $20 more, the standard model adds a start-up disk with an Exploring program that introduces the machine; an icon-based DOS shell called the Application Selector; and a series of productivity programs known collectively as SystemApps.

I inserted the start-up disk. The 3½-inch drives work quickly and quietly. There are no loud, grinding noises that might make fellow passengers look up in wild surmise. IBM has done a good job with the Convertible's disk drives. Their location at the front of the machine is convenient for working in tight quarters.

Seconds later, the Application Selector appeared, displaying ten icons, each tied to a function key (see Screen 1). The first two icons are labeled Help and Tools. The Tools icon simplifies basic disk operations. When you select Tools, a new icon display appears with such functions as Copy, Erase, DiskCopy, Format, Directory, Print, Exit, and SysProfile.



To expand the Convertible you clip on optional units that extend from a bus on the back. From left to right: the CRT display adapter, the serial/parallel adapter, and the thermal printer.

SysProfile enables you to set the built-in clock/calendar and modify other system specifications, such as display mode, length of time before automatic shutoff, and internal modem options.

Function keys <F3> through <F6> provide access to SystemApps. These nifty desktop applications include Notewriter (a simple word processor), Schedule (an appointment calendar), Phone List (a phone directory and auto-dialer), and Calculator (see the sidebar "The Convertible's Desktop Accessories" for more on SystemApps).

If you prefer commands to icons, you can press <F7> to reach DOS. (IBM DOS 3.20 must be purchased separately and then copied onto the start-up disk.) Function keys <F8> through <F10> are unassigned; they can be linked to your own applications for easy loading. Pressing <Shift> and any function key from the icon menu brings up a secondary menu of ten unassigned function keys. Once you link them by filling in a menu in SysProfile, you can suspend an application and return to the icon menu by typing a two-keystroke command. After using a system utility you can go to the icon menu and then return to the application where you left off.

Learning to Live With LCD

The Convertible's display is an improvement over many earlier LCD systems. By bonding the screen's polarizer to the glass front plate and customizing the Convertible's LCD font, IBM has squeezed a little more legibility out of the LCD than most laptops manage to do. However, because the display doesn't contain its own light source, the text doesn't leap out at you, and the dark gray on lighter gray lacks the contrast of backlit LCDs. The light gray background also reflects a lot of light, occasionally turning the Convertible into an expensive compact mirror.

Also, there's not much variance between half-intensity, full-intensity, and boldface characters. For example, distinguishing negative numbers is difficult in *SuperCalc 3* release 2.1. However, using SysProfile, you can substitute underlined or inverse video characters for full-intensity characters.

You can move the screen back and forth for the best angle of light and then adjust the contrast with a panel control directly under the screen. Unfortunately, the Convertible's screen doesn't go back as far

Optional Equipment

A number of hardware extras add both to the PC Convertible's appeal and to its price. The system's options include a display adapter, monochrome graphics and RGB monitors, a serial and parallel interface adapter, a thermal transfer printer, a printer cable, a battery charger, an automobile power adapter, and an internal modem.

If the Convertible is destined to be your desktop computer, and you're unsatisfied with the Convertible's LCD screen, you'll definitely want to investigate the optional $180 Monochrome Display. The Display measures 9 inches diagonally, compared to 13 inches for a PC monitor, and displays green text on a black background. It sits atop a stand shaped much like the Apple IIc's, so the screen can jut over the system unit.

Because the Convertible won't drive the PC's Monochrome Display, text on all external displays is restricted to the coarse 5-by-7-pixel color graphics character set. However, compared to the LCD screen, it's quite legible. The Convertible's Monochrome Display supports the Convertible's 25-line-by-80-character and 25-line-by-40-character text modes, as well as its standard four-color (actually, gray scale) medium-resolution (320-by-200-pixel) and two-color high-resolution (640-by-200-pixel) graphics modes.

You can use the Convertible with any RGB monitor, but IBM is also offering a 13-inch RGB direct-drive Color Display for $400. To connect either monitor, you need a narrow device called the CRT Display Adapter, which clips onto the back of the Convertible. The Display Adapter contains ports for both external monitors and costs $325.

With the Convertible's Serial/Parallel Adapter ($195), another unit that clips on to the back, you can use the computer with conventional printers and other peripherals. But if you want to print something away from the desk, look into IBM's portable thermal printer, which is a slender unit that snaps on to the back of the computer and extends the Convertible's length by about 4½ inches. With that printer in tow, you won't even need the Serial/Parallel Adapter.

The printer offers unidirectional printing at 40 cps during burst speed. This figure doesn't take into account time between lines or time required to print graphics. The unit can act either as a thermal-transfer printer or as a near letter quality dot matrix printer, depending on whether or not you put a ribbon in it. For thermal transfer you need special heat-sensitive paper; with a ribbon you can use any fairly smooth paper—the smoother the paper, the better the print quality. A box of twelve ribbons costs $42, or $3.50 per ribbon.

Drawing power from the battery pack, the printer works quietly enough to use inconspicuously on an airplane, and its print quality is surprisingly good. You can adjust the amount of ink the pinheads use and thereby control the darkness of the printout. The printer has a linefeed switch and an optional 22-inch cable.

I found only three disadvantages to the printer. IBM statements to the contrary, attaching this item to the back of the Convertible was quite difficult. Also, although it is small, the printer adds sufficient length to the computer to make it difficult to use on an airplane meal tray or in other crowded settings. Finally, generating output by invoking <Shift>-<PrtSc> is an excruciatingly slow process.

The Convertible has an optional internal auto-answer modem that works at 110, 300, or 1200 bps. I encountered no problems using the modem with *Crosstalk XVI,* but because the modem's command set is not Hayes compatible, you may encounter compatibility problems with communications software not written specifically for the Convertible.

Installing the board is a little tricky. You must remove the rear cover, the power supply board, the modem connector plug, and the keyboard before you can attach the modem board. Although IBM's installation instructions are clear, the company recommends that a dealer install the modem for you.

The PC Convertible has a bus connector extending out the back of the unit to which third-party firms will be able to connect other add-on products. This bus differs slightly from that of the PC itself and will thus require newly designed peripherals. You cannot attach the computer to an IBM-compatible expansion chassis as you can with laptops such as the DG/One and the Datavue 25.
–P. F.

as it should–less than 45 degrees from vertical. The angle is sufficient for the average person using the computer on a desk top, but when it's on the meal tray of an airplane, you'll have to adjust your seat back to get a good view. Even for desk-top use, the ability to push the screen back another 10 degrees would help.

Although the screen displays the full number of columns and lines, it measures only 3¾ inches high by 10⅝ inches wide, and the aspect ratio of a character is only 3 to 1. This means that you'll have to get used to viewing oblong pie charts and bar graphs.

Another IBM Keyboard

I loaded Notewriter and began typing a memo. The keyboard is quite comfortable, and although it lacks the crispness of other IBM keyboards, it seems more responsive than most laptop keyboards. You can shut off the soft key click, but you cannot modify it incrementally. IBM has been generous with the keyboard's layout–there's more room between keys than most laptops have (for example, the DG/One). The ample spacing and sureness of the keys guarantee that you won't have to change your typing style when you switch back and forth between the Convertible and a desktop computer.

The Convertible's <Shift> keys are properly positioned, a major improvement over the PC's keyboard. In addition, the Convertible has a ten-key numeric keypad embedded in the regular keys. The numbers of these keys are marked in blue on their front sides; you activate their numeric function by first pressing the special <Fn> key on the lower left of the board. The cursor keys sit on the lower right of the keyboard in an inverted-T formation. This is a more logical arrangement than on laptops that place the cursor keys in a straight row. Pressing the cursor keys together with <Fn> gives you <PgUp>, <PgDn>, <Home>, and <End>.

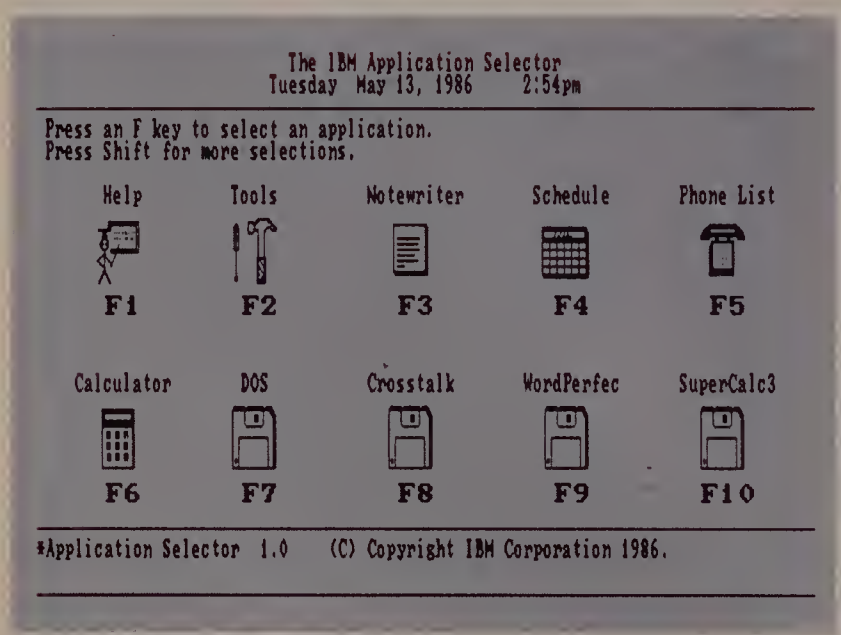
I had only two quibbles with the keyboard. First, the <Backspace> key in the upper right corner sits too far from the action; IBM could have brought it closer to the home row by reducing the swollen <Enter> key. Second, a large <CapsLock> key resides where you expect the <Ctrl> key to be, while the <Ctrl> key has been relegated to the lower left corner. If you use programs that depend on <Ctrl>-*key* commands, you'll find your hands continually yanked off the keyboard's center of gravity. It's difficult to understand why IBM keyboard layouts persist in such obvious design flaws.

Nonvolatile Convertible

We finally reached the head of the runway queue. The No Smoking and Fasten Seat Belt signs flashed, and the engines were revving. I turned the computer off. The plane roared down the runway, swiftly accelerating, and suddenly there was a feeling of lightness as the tarmac fell away. We wheeled around high over San Francisco and headed south along the Pacific Coast toward Los Angeles.

I turned the Convertible back on again. It went directly back to my file, completely bypassing the main menu. This "resume" mode is one of the Convertible's most convenient features. Taking advantage of the nonvolatile, battery-powered CMOS chips, the system retains memory of your last document and whisks you there at once when you power up again. If you prefer a more traditional approach, you can suppress this feature in SysProfile. The resume mode is disabled when an external monitor is in use.

You can expand the Convertible's 256K of RAM to a maximum of 512K by adding two IBM 128K memory boards, costing $195 each. Currently, no 8087 coprocessor chip can be attached. Continuing its open architecture policy, IBM has distributed system specifications to third-party vendors and has provided access to its unique, non-PC-compatible bus via a connector at the rear of the unit. Soon, no doubt, vendors will develop a 256K memory board and other add-ons. Already, Mountain Computer has released a 20MB external hard disk for the Convertible—a move that other hard disk manufacturers are likely to imitate.



Screen 1: The PC Convertible's Applications Selector software provides an icon-based user interface to DOS and four productivity packages. Other applications can easily be tied to the icons for quick access to desk accessories.

Because IBM designed many of the chips rather than purchasing them from outside vendors, hardware firms will have more trouble copying the Convertible's design than they did the PC's. The Convertible is assembled entirely by robots at IBM's manufacturing plant in Austin, Texas, which turns out a new computer every 6 minutes. Due to the surface mounting of VLSI components, the system's main circuit board contains fewer than 20 chips.

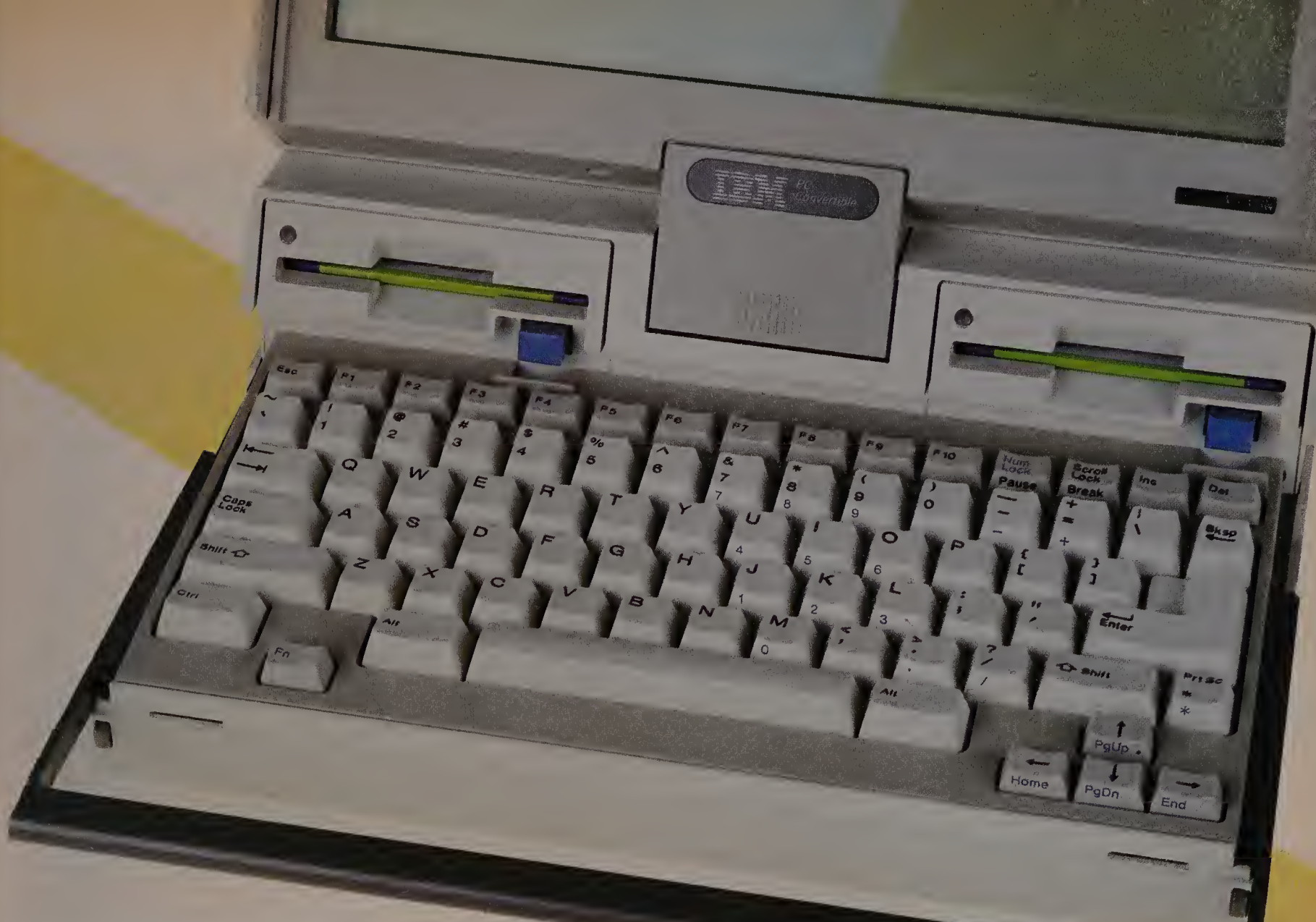
According to *PC World* tests, the Convertible, which runs at 4.77MHz, is slightly faster than the PC at computation and graphics display. The slight speed difference is due to the fact that LCD screens don't require the same screen refresh as a standard CRT display.

Live Long and Recharge

Inside the Convertible is a removable nickel-cadmium battery that lasts from 6 to 10 hours, depending on disk access and use of peripherals. Leaving the computer on without using it drains very little power. The Convertible is able to conserve power by "sleeping" between keystrokes, yet no lag occurs in its display of characters. The batteries rarely last the full 10 hours, but if you're into marathon word processing sessions, you should be able to survive 8 or 9 hours before heading for the nearest electrical outlet.

Unlike portables such as Quadram's Datavue 25 or Hewlett-Packard's HP 110, the Convertible provides no way to monitor battery depreciation. When battery power gets low, the machine emits three quick beeps, and a warning flashes in the upper right corner of the screen. If you don't press any keys within the next 2 minutes, the system automatically shuts down, retaining whatever is in RAM. If you do press a key, the warning will recur in another 2 minutes. Only if you continue to work and ignore the signals will the computer completely conk out.

The Convertible's external AC adapter adds only 1 pound to the weight of the system. It contains a battery recharger that goes into action whenever the adapter is plugged in. However, the machine gives no indication when it is fully charged.



The Convertible's two 3½-inch drives and keyboard. Why were the <CapsLock> and <Ctrl> keys reversed?

Three and a Half

The arrival of the Convertible has spurred the personal computer world's move toward 3½-inch disks, which are superior to their 5¼-inch counterparts in every way: they're smaller, more durable, and easier to transport. Although it may take some time, the 5¼-inch floppies appear destined to join punched cards and magnetic tape in the museum of computer history.

By the time you read this, most major programs should be available in the 3½-inch format. I tested several of the first PC programs available for the Convertible: MicroPro's *WordStar* and *WordStar 2000,* Living Videotext's *ThinkTank* and *Ready,* and TCS Software's *Client Ledger System;* I also looked at prerelease versions of Computer Associates' *SuperCalc 3* and *SuperProject Plus.* All these programs functioned well on the Convertible.

If you have a DG/One, you may be rejoicing at the prospect of a tide of new IBM software on 3½-inch disks. However, due to incompatibilities in screen architectures, programs for the new laptop may look a little odd on other compatibles, if they work at all.

What if you already have a PC or compatible in your office and wish to use the Convertible in tandem with it? While IBM offers no 5¼-inch drive with the Convertible, you still have a couple of options. First, you can purchase a 3½-inch external disk drive for your PC. IBM offers a model for the PC and XT and another for the AT. Or you can transfer the files by modem or by a direct null modem cable connection from one computer to the other. However, first check your software license. Some licenses prohibit copying a program from one medium to another or using a program in two computers at the same time.

The Convertible's Desktop Accessories

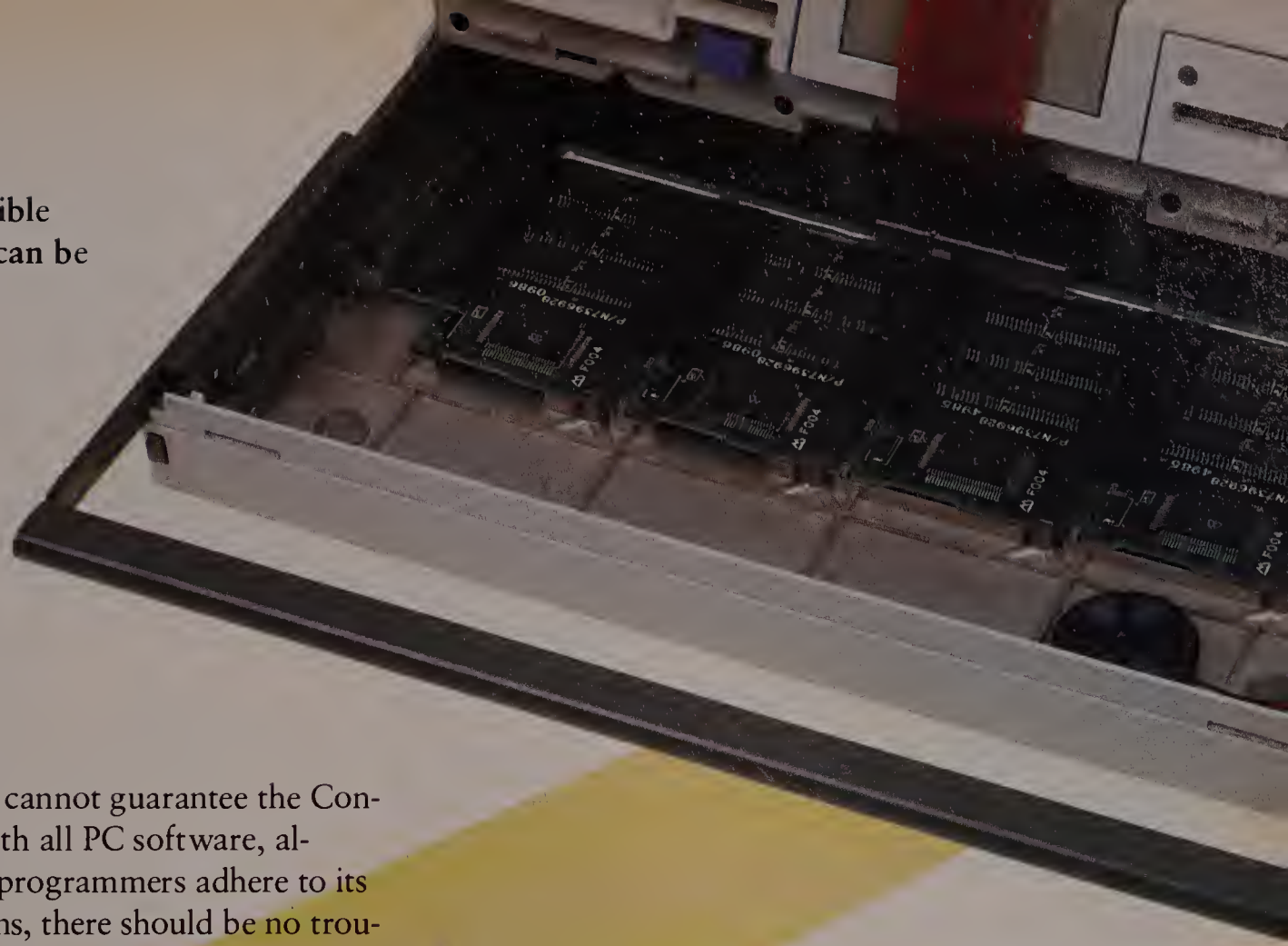
With the standard model Convertible you receive a start-up disk containing four desk accessories collectively called SystemApps: Notewriter, Schedule, Phone List, and Calculator. Together with the tutorial and the icon-based Application Selector, they are well worth the extra $20.

Notewriter is a mini-word-processor that lets you create, save, revise, and print documents of up to 6 pages. When you press <F3> from the Application Selector menu, a blank page appears with an 8-inch rule across the top. You can give the document a name, which appears at the top of the screen, and the program keeps track of line numbers for you. Across the bottom of the screen, the new function key menu lists all the program's features except editing commands. Notewriter provides automatic wraparound but does not set an automatic margin at the top of the page. Notewriter cannot paginate, but it will perform block moves and copy and delete functions. The program creates ASCII files that you can export to another word processor.

The second application, Schedule, lets you keep track of daily appointments and alerts you to impending events. You can set up to 32 alarms, each of which plays a series of tones and displays the time and text. The schedule can be displayed by day, week, or month, and you can place an asterisk next to times or dates that have particular significance.

Phone List enables you to create, save, and quickly access names, addresses, and phone numbers, plus comments. Although this utility won't sort alphabetically, you can quickly look up a name by typing the first few letters. If you have a modem, you can also use Phone List to dial numbers automatically.

Calculator displays an outline of a hand-held calculator and lets you add, subtract, multiply, divide, and find percentages. When Calculator comes up, it automatically activates the numeric keypad embedded in the keyboard, so you can use either it or the conventional number keys to do your math. Calculator accepts numbers of up to 8 digits. *–P. F.*



The robot-made Convertible comes with 256K, but it can be expanded to 512K.

IBM has said that it cannot guarantee the Convertible's compatibility with all PC software, although it also says that if programmers adhere to its BIOS and DOS conventions, there should be no trouble. Problems occur when programmers sidestep the ROM BIOS in order to improve performance. However, the vast majority of programs are already compatible.

A Smooth Landing

When the flight attendant announced the descent into Los Angeles, I turned the power off, packed the Convertible into its carrying case, and placed it under the seat, knowing that my spreadsheet would appear where I left off the next time I turned the Convertible on. After a smooth landing, I left the plane and walked down the concourse, reflecting on the Convertible's merits. It is a solid piece of work with no significant defects. Its two front-facing 3½-inch disk drives, 10-hour battery, and portability are all significant pluses. The keyboard and screen have minor flaws, but they're better than most.

Every laptop has its compromises and its innovations. Laptops containing hard disks and electroluminescent displays are now coming on the market, but always at the expense of battery life and budget. IBM has clearly chosen a slimmed-down, less-is-more approach and has designed an affordable computer built for the road. Sure, we can dream of a $2000 laptop with a readable screen and all-day batteries, but that may be a long time coming. In the meantime, the PC Convertible is a fine machine that has proved itself where it counts—on the desk top and in the coach of a 737. As I picked up my baggage, I was already thinking about how to use the machine on the trip back.

Writer Paul Freiberger is coauthor of Fire in the Valley: The Making of the Personal Computer *(Osborne/McGraw-Hill, Berkeley, California, 1984) and* Computer Sense *(Bantam, New York, 1986). He lives in Palo Alto, California.*

IBM PC Convertible
IBM Entry System Division
P.O. Box 1328
Boca Raton, FL 33432
800/477-4700, 800/447-0890
Alaska and Hawaii,
800/322-4400 Illinois
List price: $1975, start-up disk $20, DOS 3.20 $95, monochrome display $180, CRT display adapter $325, printer $295, color display $400, serial/parallel adapter $195, internal modem $450, printer cable $45, battery charger $25, automobile power adapter $25, 128K memory board $195

Protection Money

Hard disk owners take heed: You could find yourself beset with more mishaps than befall a struggling shopkeeper who's behind in protection payments. What would it take for you to sleep at night, knowing your valuable data is intact? PC World looks at four tape backup systems from Tecmar, Maynard Electronics, Hewlett-Packard, and Sigma Designs.

Reed McManus

Hard disks know of innumerable ways to sabotage their reason for being: A power outage sends a hard disk's head diving through data, a tired worker obliterates a critical file at the end of a workday, or a sinister gang of electromechanical parts conspires to remind you that sometimes machines simply fail. Data disasters are not so threatening when you rely on floppy disks—one trashed disk can usually be reconstructed without too much pain and suffering. If not, the loss of a 360K floppy is not the end of the world. But now that the equivalent of 28, 56, or 83 360K floppies can be wiped off a 10MB, 20MB, or 30MB hard disk in one fell swoop, you had best back up files regularly. You have two choices: an inexpensive but slow floppy-based system, or a tape system that automates the task but may cost more than your hard disk.

Floppy-based backup programs have been around since the arrival of DOS 2.00's BACKUP and RESTORE commands. To back up a 10MB disk using DOS, you must sit patiently for up to an hour swapping as many as 28 or 29 floppies in and out of disk drives. Even backup utility programs that

Elaine Faris Keenan

The Tecmar QIC-60H (left), housed in a slim cabinet, is fast and easy to operate. The Maynard Maynstream 20 (middle) is small, light, and low-priced. The Hewlett-Packard 9142A (right) includes powerful utilities for a comprehensive file management program. Sigma Designs' OneReel Tape ORT-010 (upper right) is compact and utilitarian.

know about subdirectories and can calculate the number of floppies being backed up require 15 minutes or so of tedious disk juggling for a 10MB backup.

If you need a fast, convenient, and unattended backup system and have $1000 or $2000 to spare, the best choice is tape. Tape systems back up and restore as much as 60MB and can archive data, transfer data between hard disks, and reassemble noncontiguous hard disk files to speed access time.

PC World tested four external units complete with power supplies and fans: Tecmar's QIC-60H (QIC stands for quarter-inch compatibility), Maynard's Maynstream 20, Hewlett-Packard's HP 9142A, and Sigma Designs' OneReel Tape ORT-010 (see Table 1 for a comparison of features). The review is limited to external units because internal drives severely tax an IBM PC's 63.5-watt power supply. In addition, the PC XT and similar systems with full-height floppy disk drives and a hard disk leave no space for an internal tape unit.

Tape backup systems are expensive, but convenience and speed are often more important than

price. The value of a tape system depends on the usability of its software. If a backup system is not easy to operate, only the most devoted users will regularly back up files. All four systems tested allow you to specify the precise data you want backed up or restored.

Spread the Cost

If you balk at paying as much as $2200 for a hard disk insurance policy, one way to soften the blow is to buy one tape unit to back up several PCs. You will have to coordinate backup activities, because each PC must have its own tape drive controller board (except Sigma Designs' OneReel, which plugs into the floppy disk drive controller). Unfortunately, most manufacturers don't design machines with portability in mind. Of the four tested, only the Sigma and Maynard units provide carrying handles. They weigh 5 and 6 pounds, respectively, the Tecmar weighs 11 pounds, and the Hewlett-Packard, a hefty 19 pounds.

Before committing to a tape system, users of 10MB and 20MB hard drives should consider how much data changes daily; a floppy-based backup system may be adequate. After the time-consuming initial backup of an entire 10MB or 20MB hard disk onto floppies, you can often keep your daily backups manageable by backing up only files that have changed since the last backup session. DOS 2.00 and all but one of the tested backup systems offer this /M (modified files only) feature.

Tape Technology

Tape backup is a descendant of open-reel mainframe systems. Hard drives store data randomly on a disk, whereas tapes store it sequentially, allowing data to be recorded quickly but prohibiting fast random access. Only the HP 9142A and the Sigma OneReel can be used as disk drives. Access times are so slow, however, that you will only use this facility if your hard drive crashes.

Tape data is stored sequentially, allowing data to be recorded quickly but prohibiting fast random access.

The most common tape recording medium is 3M's ¼-inch QIC DC600A cartridge, used by the Tecmar and Hewlett-Packard units. You never touch the 15MB or 60MB tape enclosed in its virtually bombproof 4-by-6-inch cartridge. Instead of pulling the tape between capstans like an audio tape player, QIC cartridges pull it along a tensioning belt to prevent stretching. An aluminum baseplate keeps the tape from flexing. The QIC standard ensures that any blank QIC tape will work in any other system designed for QIC, and that a QIC tape created on one machine can be transferred to a compatible unit from the same manufacturer. The standard does not enable a tape to be traded among different manufacturers' machines.

Other tape media tested include the 10MB, ½-inch, self-threading open spool used by Sigma Designs' OneReel and the 20MB, ⅛-inch, audio cassette format of the Maynstream 20. Both allow large backups to span two or more tapes, and both cost less than the QIC DC600A cartridge. Quarter-inch cartridges cost as much as $40 each because of their elaborate drive mechanism. At about $15, the Sigma tape is more economical for backing up a single 10MB hard drive. Even though the Sigma has an open reel, accidental unwinding is unlikely because of the way the spool grips the extra-wide aluminum tape leader.

Maynard's cassette is small and rugged. It follows QIC standards without using the expensive components of the larger cartridge. Maynard claims its combination of high-density tape, a precise digital drive motor, and the short distance the tape travels between capstans prevents stretching.

Backup Techniques

Until recently, tape backup users had to choose between image and file-by-file backup methods. An image backup is a fast, bit-by-bit, mirrorlike copy of an entire hard disk. File-by-file backups allow you to select only those files you want to store, a method much slower than an image backup. Most manufacturers now include both image and file-by-file methods. (The Maynstream 20 of-

fers only file-by-file backup but at speeds comparable to the image backups of the other units.)

An image backup transfers data sector by sector as the tape streams by a write head at a constant rate (generally 90 inches per second). If the tape drive's software is up to the task, data can be written from the hard disk to memory and from memory to tape without time-robbing stops and starts. But the undiscerning image copy mimics the hard drive's sectors and cannot restore individual files. As a result, you must restore the entire disk's data to the same disk it came from to avoid putting good data on bad sectors.

The file-by-file method is not as fast as image backup, but it lets you back up specific files or directories. The best backup systems even let you select files modified since the last backup session and files created after a specified date. You can use DOS global filename characters (* and ?) to process all files fitting a general description.

Insuring Your Insurance

The HP 9142A uses an elaborate system called PC/T that allows it to detect and correct errors both while the tape is being written and afterward. PC/T creates a 50 percent redundant block of data for every two 4K blocks of data on the tape. Unfortunately, the thoroughness of this error correction system slows the HP's file-by-file data transfer to a crawl. It can take as long as 85 minutes to

Table 1: Tape drive features

	Tecmar QIC-60H	Maynard Maynstream 20	Hewlett-Packard 9142A	Sigma Designs OneReel Tape ORT-010
Formatted capacity (MB)	60	20	15 or 60	10
Warranty	12 months	12 months	12 months	6 months
Format	¼-inch cartridge	⅛-inch cassette	¼-inch cartridge	½-inch spool
Tracks	9	4	16	4
DMA channel number	1	1	3	2
Tape format required	no	no	85 minutes off line	45 minutes
Auto backup	no	yes	no	no
Multiple volumes	yes	yes	yes	no
Span tapes	no	yes	no	yes
Use as drive	no	no	yes	yes
Image	yes	no	yes	yes
File-by-file	yes	yes	yes	yes
Back up modified files only	yes	yes	no	yes
Back up by date	yes	yes	no	yes
Append existing tape data	yes	yes	yes	yes
Back up subdirectories	yes	yes	yes	yes
File restore from image	no	n/a	yes	yes
Restore image to different disk	yes	n/a	yes	no
Restore files to different directory	yes	no	yes	no
Tape directory	yes	yes	yes	yes
On-line help	excellent	no	good	no
Diagnostic software	no	no	yes	yes
Ease of installation	excellent	excellent	excellent	good
Documentation	good	excellent	good	good

format each tape under PC/T. Formatting can be performed off line, however, freeing your computer for other use.

The Tecmar and Maynard drives use read-after-write, "on-the-fly" error correction techniques. Separate read and write heads immediately record, verify, and correct errors during backup, but not after writing the tape. If a bad section of tape is found, the tape keeps moving and the heads keep writing and verifying until the information is correct.

The Sigma OneReel's single-head system relies on the IBM PC floppy disk controller's error detection techniques: Out of every 17 tape sectors, one is reserved for a parity record. One error can be corrected using this parity block. If more than one error occurs in 17 sectors, the system detects all the errors but can correct only the first. A complete second pass must be performed to verify data.

All four drives provide separate verification utilities that compare the tape's and the hard disk's data byte for byte. With all but the Sigma OneReel, these operations are necessary only when data will not be rewritten during the next backup session, for example, when archiving data or backing up program files.

All four drives provide separate verification utilities that perform byte-for-byte comparisons of the tape's and the hard disk's data.

You can verify the HP 9142A's image backup when you invoke the backup. The Maynstream 20's separate verification program can be run after any backup or restore operation. By adding /V to an image backup command, you can easily invoke the Sigma OneReel's verification routine, which Sigma recommends you do each time you back up. Tecmar's menu-driven verification program does not check tape data against disk data; it compares the data currently on the tape to the data originally written to the tape to ensure that tape data has not been corrupted.

The Test

Each unit had to back up and restore a 20MB hard disk containing 671 files and 20 directories plus a single 2.4MB directory containing 42 files (see Table 2). Tests were performed on a 512K IBM PC with a 20MB Mountain Computer DriveCard, a Microsoft RAM board, and an IBM monochrome display adapter. The 20MB backups were done in image mode when available, and the 2.4MB test in file-by-file mode. Both verified and unverified tests were run when possible.

We tested two units from each company to determine how well each unit exchanged tapes with an identical unit. The manufacturer's default configurations were in effect. All four drives and their doubles succeeded without a hitch.

The Tecmar, Maynard, and Sigma installation programs set CONFIG.SYS buffer size between 10 and 20, which may affect buffer sizes set for use with other applications. You may be able to increase the speed by trying higher settings. DMA (Direct Memory Access) channel settings can be altered on both the Tecmar and the Maynard. The PC's DMA channel settings determine which of four paths will transfer data blocks between memory and devices such as tapes and hard disks. Networks use channel 1, floppy disk controllers, channel 2, and hard disks, channel 3. The Tecmar and Maynard tape controllers use channel 1. Separating tapes and hard disks allows fast, simultaneous data transfer between the tape and memory and between memory and the hard disk. Conflicts with a network can be avoided only by changing the tape's DMA channel. The HP 9142A shares channel 3 with the hard disk, a method that is slower because the tape and hard disk must operate sequentially rather than in parallel.

Tecmar QIC-60H

The QIC-60H works flawlessly—as well it should for $2144. Its slim cabinet sits next to a PC monitor without consuming much desk space, and the modemlike bank of LED lights indicates when the unit is on and keeps you apprised of all tape functions. The menu-driven software installation program creates a large directory called QIC and changes the buffer setting in your CONFIG.SYS file to 17.

You perform image and file-by-file backups as well as restores by means of menus or DOS-like commands. Up to 256 volumes can be backed up on one tape; each includes the date, the time, and a helpful 42-character label of your choosing. A function-key menu system lets you change your mind at any juncture and provides excellent on-line help. Status reports appear on screen as the tape operates, and printed error reports document a tape's integrity.

The Tecmar QIC-60H is fast in both file-by-file and image modes, although in our tests it was unable to create streaming image backups without a few stops and starts. Because the QIC-60H knows how to avoid writing data to bad disk sectors, you can restore an image backup to a disk other than its source. Image backups must be restored in their entirety, however.

Instructions are provided for changing default settings to allow multiple backups on a single tape, file name displays, subdirectory searches, and file overwriting. You can override all backup defaults and alter the system's DMA channel, I/O addresses, and interrupts.

Tecmar's full-size, spiral-bound manual is poorly organized but thorough. A system overview, hardware and software installation instructions, and tape cartridge instructions are dispersed across three chapters. The manual provides complete technical information, including discussions of all system default configurations, error messages, tape maintenance, and backup guidelines. Software updates are available at no charge for one year after purchase.

Table 2: Tape drive performance in minutes:seconds

	Tecmar QIC-60H	Maynard Maynstream 20	Hewlett-Packard 9142A	Sigma Designs OneReel Tape ORT-010
Format tape	n/a	n/a	85:00 off-line	45:00[1]
20MB backup	6:17 image unverified	6:00 file-by file unverified	13:10 image unverified	15:30[2] image unverified
	12:35 file-by-file	12:00 file-by-file verified[3]	25:20 image verified	31:00[2] image verified
20MB restore	4:32	12:50	14:40	15:30
2.4MB file-by-file backup	2:59	1:15	165:00	6:45
2.4MB file-by-file restore	2:40	1:55	160:00	4:00

[1] First two tapes are factory-formatted
[2] Tapes hold 10MB each; add approximately 2 minutes to rewind and load second tape
[3] Separately-run verify program

Maynard Maynstream 20

The Maynstream 20 is a pleasant surprise: Its file-by-file data backups are as fast as the image backups of the other tested systems. To sweeten the deal, the Maynstream 20 has the most polished manual of the lot, very clear menus, and a price well below the high-end Tecmar and Hewlett-Packard units.

The Maynstream 20's carrying handle, compact cabinet, and light weight make it very portable. Each computer it supports must have a short controller board or a Maynard Sandstar multifunction module. There is no light to tell you when the unit is on—the sound of the fan is the only indication. A light signals when the tape is running.

Hardware and software installations take just a few minutes each. Software installation is a simple matter of loading a utility disk and typing A:INSTALL. Installation changes the buffers statement in your CONFIG.SYS file to 'buffers = 15' and creates a large directory (approximately 200K).

Erase, tension, directory, and verify operations use commands or the *1-2-3*-like menu. In addition to menus and DOS-like commands, an automatic backup routine enables you to make backups by simply typing SAVE. The number of volumes you can record on each tape is limited only by the

size of the tape. When a tape is full, the system prompts you for a new tape.

Because the Maynstream 20 operates only in file-by-file mode, you can restore backups to any disk. Directory files must be restored to the same directory, however. Unlike most file-by-file methods, the Maynstream 20's allows you to back up non-DOS volumes.

The manual is well crafted. Step-by-step instructions with photographs and drawings simplify the installation process, and well-organized introductions to automatic backups, the menu system, and the command structure make the system easy to learn. Tape-use guidelines and error messages are clearly explained. A software upgrade program is available for $50 a year.

Hewlett-Packard HP 9142A

The HP 9142A provides PC/T's ironclad data integrity and the useful ability to randomly access any tape file, including image backups. Image backups are faster than file-by-file. The HP took more than two hours to back up a 2.4MB directory file by file. Hewlett-Packard claims it will soon offer software that runs 20 times faster than the version tested. The new software will enable you to create file-by-file backups of modified files only and to set days and times for automatic backups. If the new software fulfills these claims, the HP 9142A will be worth its $2200 price tag.

The HP's menu-driven software-installation program copies required files to any hard disk directory and adds the HP device driver to your CONFIG.SYS file, but buffers are not changed. Although Hewlett-Packard provides no power-on indicator, lights warn you when a tape is running, is write-protected, or has reached the end of its useful life (approximately 130 backups).

Unlike the QIC-standard Maynard and Tecmar units, the HP requires you to format the tapes.

The HP 9142A provides PC/T's ironclad data integrity and the useful ability to randomly access any tape file, including image backups.

Each 60MB tape can be formatted as one, two, or four DOS volumes, enabling you to back up as many as four hard disks on one tape and access each volume with DOS. You must load and unload tapes manually, which takes 5 minutes. The HP also supports 15MB tapes.

DOS-like commands or two separate menu-driven programs invoke the HP's image and file-by-file routines. HPTAPE formats and erases tapes, creates multiple volumes, and performs image backups and restores. Because the tape's directory is remapped for each restore, image copies can be restored to any drive. FILEMAN, another HP backup utility, performs file-by-file operations, provides directories for all drives including the tape, and executes file searches and generic DOS operations. Both programs supply online help. Although FILEMAN is an all-encompassing file management program, it is harder to use than the dedicated backup programs of other tape drives. Its current version does not allow you to back up only modified data or data created after a specified date. To perform an image backup, you must exit FILEMAN and call up HPTAPE. In its favor, FILEMAN allows file-by-file manipulation of image backups.

The HP 9142A manual is thorough but cumbersome. Instructions are clearly presented in step-by-step detail and with well-placed drawings, but you must wade through large sections of material devoted to HP's hard disk and non-PC applications.

Sigma Designs OneReel

Although not as elaborate as the other drives, Sigma's OneReel provides the essential ingredients of tape backup and the ability to randomly access all files, including image copies. The drive costs a relatively low $945. Its self-threading 10MB spooled tapes can be linked to handle large disks, but the OneReel is essentially designed for use with 10MB or smaller hard disks. It is the most portable of the drives tested: The light, compact system taps directly into the PC floppy controller board's external 37-pin D connector without requiring its own board. (You must

install the OneReel as a third floppy drive in Compaqs and ATs that lack the 37-pin port.)

The OneReel manual is a bare-bones 30-page booklet that gets the message across. The hardware installs smoothly in less than a minute; software installation, however, involves copying the OneReel device driver program to the hard disk's root directory and creating or changing a CONFIG.SYS file. Two factory-supplied tapes are formatted for immediate use, but all others must endure a 45-minute on-line formatting process. Lights alert you when power is on and when a tape is running; the tape door is locked any time a tape is loaded.

The OneReel performs both image and file-by-file backups, but with few luxuries. What's missing is a friendly, menu-driven user interface. You must invoke all operations by using DOS operations or the faster DOS-like commands of Sigma's structured copy program, RCOPY. The only on-screen help is a summary of command statement syntax and parameters. You have very few opportunities to change your mind and abort an operation; even when the program warns you of imminent disaster, it does not tell you how to abort (<Ctrl>-<Break> does the trick). Users must accustom themselves to the lag of the OneReel's buffer, which may take as long as 2 minutes to begin writing information to the tape directory after a tape operation has stopped.

Although floppy-based tape drives transfer data at one-third to one-half the speed of independent tape drives, the OneReel performed reasonably well, even when running the recommended second-pass verification option. Because two OneReels cost the same as a more elaborate system, budget-conscious users can consider the luxury of buying a separate tape drive for each PC in the office.

The OneReel performs both image and file-by-file backups, but with few luxuries. What's missing is a friendly, menu-driven user interface.

Tale of the Tape

There is a tape drive insurance policy for everyone. If price is no object, take a look at the well-equipped Tecmar QIC-60H. It performs well on all counts, and it's the tape system IBM sold in its Product Centers. If data integrity is paramount, the Hewlett-Packard 9142A's elaborate error-correction techniques will make your backups worry-free. Be sure the promised faster file-by-file software for the HP is available before investing, though. If you are backing up 10MB or less, consider the Sigma OneReel. It offers the essential high-end features at a low-end price. The all-around winner, however, is Maynard's Maynstream 20. Its audio-cassette-like tapes and separately run verification program may scare some people off, but its manual and lightning-fast file-by-file transfer are superb.

Carefully consider how you want to protect your hard disk's data, then choose your tape drive accordingly. Even with the most elaborate tape backup system, keep your fingers crossed and entreat the spirits to keep your hard disk whole. ●

Reed McManus is a Contributing Editor to PC World.

HP 9142A
Hewlett-Packard
800/367-4772
List price: $1990, IBM PC controller $199
Requirements: 192K

Maynstream 20
Maynard Electronics
460 E. Semoran Blvd.
Casselberry, FL 32707
305/331-6402
List price: with controller $1395, Maynstream 60 $2095
Requirements: 128K

OneReel Tape ORT-010
Sigma Designs
2023 O'Toole Ave.
San Jose, CA 95131
408/943-9480
List price: $945
Requirements: 192K, no controller required

QIC-60H
Tecmar, Inc.
6225 Cochran Rd.
Solon, OH 44139
216/349-1009
List price: with controller $2144
Requirements: 256K

Seven Up on EGA

Thanks to burgeoning software support, IBM's Enhanced Graphics Adapter is fast becoming the de facto standard for graphics on the PC. But can EGA compatibles do better for less?

Eric Knorr and Karl Koessel

IBM's Enhanced Graphics Adapter (EGA) is helping raise a new generation of graphics-intensive software for the PC. Surpassing even the Macintosh's hard-edged graphics, the EGA's 640-by-350-pixel enhanced graphics resolution supplies PCs with the crispness vital to personal publishing, CAD (computer-aided design), and Mac-like user interfaces. And with 16 simultaneous colors available from a palette of 64, the EGA makes quality slide-show presentations on your PC a viable option.

But for most users, the EGA promises an end to the Hobson's choice of monochrome monotony or the eyestrain of poor-quality color text. Featuring an 8-by-14-dot-matrix character box, the EGA produces color text approaching the sharpness of the IBM Monochrome Display Adapter's 9-by-14 box. The specs of other boards may outstrip those proffered by the EGA, but IBM's hardware hegemony has ensured the EGA's position as the prevalent graphics standard. Consequently, software vendors in increasing numbers are rallying behind the EGA.

Now a herd of EGA compatibles has arrived to capitalize on the EGA's widespread software support. Aware that the IBM board's high cost has daunted many users, most vendors are selling compatible products for about half the price of IBM's trendsetter. Along with the influx of boards comes a flock of low-cost monitors that mimic IBM's Enhanced Color Display (ECD), the 350-line monitor matched to the EGA's capabilities. With an EGA compatible and a third-party ECD monitor (or your old monochrome marvel), moving up to EGA quality won't cost you an arm and a leg (see the sidebar "Monitoring the Possibilities").

The EGA struts its stuff on an Enhanced Color Display with 16 simultaneous colors.

Copying Complexity

Pity the poor board maker. The EGA is among the most complex video adapters ever produced for the PC, introducing its own enhanced graphics standard as well as being able to run any monochrome text-based application and a handful of programs written for IBM's Color/Graphics Adapter (CGA). Within each video standard are a variety of modes, which means that fashioning a fully compatible board is an arduous engineering task.

The EGA is not limited to running with a 640-by-350-pixel enhanced graphics monitor. As a result, a board compatible with the EGA must have not one but two character sets in ROM: one for enhanced color graphics monitors and monochrome monitors, and another for standard color displays. Depending on the video mode and the type of monitor indicated (determined by the EGA's on-board switch block and jumper), the EGA reads the appropriate character set from ROM into its on-board RAM when you start your PC. EGA software can then add to (or, for other modes, exchange) that character set.

Confusion has also plagued PC users deciding which EGA configuration to buy. The basic EGA

sells for $524, but because just 64K of RAM is on board, only 4 simultaneous colors are available in enhanced graphics mode. To exploit the board's potential of 16 simultaneous colors in all modes and the ability to replace the EGA's default character sets with two other sets of 256 characters, you need the Graphics Memory Expansion Card (GMEC), a 64K piggyback board that sells separately for $199. For smooth scrolling and panning, IBM offers the Graphics Memory Module Kit (GMM), basically a 128K handful of RAM chips that brings the price of a fully loaded EGA to slightly less than $1000.

With one exception, the EGA compatibles evaluated here have collapsed these three modules—basic EGA, GMEC, and GMM—into a single 256K board that sells for approximately the same price as the bare-bones IBM EGA. A few firms have even compressed the circuitry to a single short board that will function in the XT's notorious eighth slot. Whatever their length, all these boards are built around a four-chip set from Chips and Technologies, a company that's sucessfully duplicated the IBM board's essential hardware. Each manufacturer has, however, used its own EGA BIOS (basic input/output system); some add hardware for CGA emulation, some include Hercules Graphics Card (HGC) emulation, and some offer both. Such departures from the IBM path naturally result in varying degrees of compatibility (see Table 1).

One sophisticated feature that gives some compatibles a tough time is the EGA's split-screen capability. The IBM board can hold more than one full-screen image in RAM. It can simultaneously display a second image, stored in a different location of the board's RAM; that image occupies any lower portion of the screen. This means that when the bottom image is removed, the full screen reappears instantly. IBM's imitators vary in their ability to perform this feat.

Close examination reveals other differences in the compatibles' impersonations. A few EGA compatibles lack a number of the EGA's more esoteric hardware features—such as the 32-pin Feature Connector and dual RCA video jacks. These omissions are understandable, given that IBM has refrained from releasing a product using the connectors, and excluding them yields a less expensive board. Nevertheless, be aware that their absence means you may miss out on possible future enhancements.

The EGA compatibles' most significant contribution is partial emulation of IBM's CGA.

One-Upping IBM

Although they may miss a trick here and there, most EGA compatibles possess more functionality than the genuine article. They generally offer a superior ability to run software written for the CGA and HGC; some boards also reveal hardware modifications. For example, Genoa's Spectra EGA and STB's EGA Plus skip the RCA jacks in favor of parallel ports, and STB offers a battery-powered clock as an option.

If space is at a premium in your XT, you should appreciate the short boards. In early ATs, however, some of the full-size EGA compatibles—and the EGA itself—are picky about their locale. Because early-model AT motherboard memory chips are taller than those in a PC or an XT, a board whose bottom edge is not high enough to clear the AT's chips must be installed in the machine's first slot (which runs alongside, rather than over, motherboard RAM).

Not surprisingly, IBM neglected to offer compatibility with the Hercules Graphics Card. The EGA and its imitators can display enhanced graphics on a monochrome monitor, but only a handful of compatibles can handle software written for the HGC. This capability enables you to run pre-EGA, Hercules-compatible graphics software, provided you're willing to use a monochrome monitor with your new toy.

Compatibility Conundrums

The EGA compatibles' most significant contribution is partial emulation of IBM's CGA. Big Blue's EGA is not quite up to the task, accommodating CGA drivers from only a few well-behaved programs and failing miserably with

Table 1: EGA compatibles—a features compendium

Product	EGA	AST-36 Model 1	MegaGraph Plus	Basic Time EGA	Spectra EGA	Quad EGA + / Vega	SigmaEGA	EGA Plus
BIOS revision		D	1.03H	1	1.10	04B	1.06	1.07
Features								
Initial display memory	64K	64K	256K	256K	256K	256K	256K	256K
Two RCA video jacks	●	●	●			●	●	
Feature connector	●	●	●		●	●	●	●
Light-pen connector	●		●	●[1]	●	●	●	●
Switch block externally accessible	●	●	●			●	●	
Display's ground line jumper is external						●		
Half-size board			●			available	●	
Works in XT's eighth slot			●			●	●	
Parallel port		optional		●	●			●
Clock and battery								optional
CGA software compatible		[2]	partial[3]			partial[4]		
HGC software compatible		[2]	partial[3]			partial[4]	partial[4]	
1-2-3 CGA graphics		[2]	●[3]			●[4]		
1-2-3 HGA mono graphics		[2]	●[3]			●[4]	●[4]	
Runs Pinball (CGA game)			●[3]					
Dither flicker								●
Smooth scroll, split screen	●	●		●	●	●	●	●
Diagnostics included	●	●				●		
Warranty period	1 year	2 years	1 year	1 year	1 year	2 years	1 year	2 years
List price 256K	$982	$525	$499	$349	$599	$595	$595	$595

[1] Pin 2 not cut
[2] Available with 3G Plus
[3] When emulation mode is invoked via <F3> key
[4] When emulation mode is invoked via software

Monitoring the Possibilities

The EGA will drive the IBM Monochrome Display, the IBM Color Display, the IBM Enhanced Color Display (ECD), or any product compatible with them. The permutations of board and monitor can be confusing, but keeping on top of them can protect your system—and your pocketbook.

Consider the possibilities: You can install an EGA driving a Color Display or an Enhanced Color Display alongside a Monochrome Display Adapter that is driving a Monochrome Display. Or you can install an EGA driving a Monochrome Display alongside a Color/Graphics Adapter that is driving a Color Display. Note, however, that attached to an EGA, each display has its unique capabilities and characteristics.

On the Monochrome Display, the EGA produces the same crisp, high-quality, 25-row-by-80-character text (including underlining) as the IBM Monochrome Display Adapter; both yield text with a 9-by-14-dot-matrix character cell. The EGA can also drive the Monochrome Display in 43-line text mode, but characters are contained within a 9-by-8-dot-matrix character cell (see "EGA at Length" *.*, *PCW*, July 1986.) In enhanced graphics mode, the EGA generates a 640-by-350-pixel graphics screen with black, normal, blinking, and intensified attributes on the Monochrome Display. In this mode, characters are slightly narrower (an 8-by-14-dot-matrix character cell).

On the Color Display, the EGA produces the same output as the Color/Graphics Adapter: 16-foreground-color, 8-background-color text mode display of 25 rows by 40 or 80 characters (within an 8-by-8-dot-matrix character cell); 4-color, 320-by-200-pixel medium-resolution graphics; and 2-color, 640-by-200-pixel high-resolution graphics. You do get a bit more with an EGA and a Color Display: This hardware combination can display full 16-color, medium- and high-resolution graphics. The Color Display, cannot, however, produce the EGA's 350-line enhanced graphics or 43-line text displays.

On the Enhanced Color Display, the EGA can be set to emulate the colors and resolutions of the Color Display. But in its enhanced resolution configuration, it can display 25 lines of 40- or 80-character 16-color text formed within an 8-by-14-dot-matrix character cell. The ECD can also display 16-color, 43-line text in 8-by-8-dot-matrix character cells. With 256K of video RAM, the enhanced configuration also permits display of 640-by-350-pixel enhanced graphics in 16 simultaneous colors chosen from a palette of 64. (For EGAs or compatibles equipped with only 64K of video RAM, only 4 colors are available from a palette of 16.)

Along with the current flood of EGA compatibles, ECD-compatible monitors are riding the enhanced resolution wave. Offering dot pitches as low as .28mm, black matrix tubes, and antiglare screens for sharper images, these monitors can represent a significant savings over

IBM's ECD. All produce vivid color, but the NEC MultiSync stands out from the crowd; it is clearly more than ECD compatible.

The NEC MultiSync, which can display up to 800-by-560-pixel resolution, can be driven by an array of adapters: the Monochrome Display Adapter, Hercules Graphics Card, Color/Graphics Adapter, and the EGA—plus high-resolution 400-line adapters like the Sigma 400 and the Persyst BoB/16 and even the 480-line IBM Professional Display Adapter. The MultiSync automatically adjusts to frequency rate and pin-out logic of the adapter to which it is attached. Controls for contrast, brightness, vertical hold, vertical size, vertical position, and horizontal position are conveniently located atop the monitor.

The NEC MultiSync monitor is truly an investment. While it can simply be plugged into and driven by all of the PC's current video adapters, its resolution and intelligence ensure its compatibility with future PC video standards for years to come. –K. K.

8042
Nanao USA Corporation
373G Vintage Park Dr.
Foster City, CA 94404
415/341-7055
List price: $720

Enhanced RGB Color Monitor
Basic Time, Inc.
3040 Oakmead Village Dr.
Santa Clara, CA 95051
408/727-0877
List price: $659

HX-12E
Princeton Graphics Systems
601 Ewing St.
Princeton, NJ 08540
609/683-1660
List price: $785

JC-1401P3A MultiSync
NEC Home Electronics
1401 Estes Ave.
Elk Grove Village, IL 60007
312/228-5900
List price: $799

most others. When you try to display *1-2-3* release 1A's graphics, for example, IBM's board returns a blank screen.

The explanation for this deficiency lies in the way graphics software is written. If a program's CGA driver directs all its instructions to the EGA's BIOS, the BIOS in the board's ROM translates the software's requests for CGA functions into instructions compatible with the EGA, and the program functions without difficulty. But if a driver bypasses the BIOS and tries to address the hardware directly, the EGA's video chip can't respond to the CGA instructions; a complete communications breakdown between software and hardware results. The majority of programs written for the CGA make these inappropriate hardware calls.

Several EGA-compatibles makers have dealt with this problem by using logic chips to trap CGA hardware calls and reroute them to the BIOS. Some have built the ability to activate these logic chips into firmware, while others supply their software on disk. In either case, boards that claim CGA compatibility can usually run most popular productivity

software written for the CGA. (But expect most games written for the CGA to bomb out.)

In a sense, the CGA compatibility issue is a red herring. The EGA's video RAM stores screen information in a different format from the CGA's video RAM. Because many CGA programs write directly to video RAM, perfect CGA emulation is an impossible dream. Furthermore, most major software vendors will send you a disk containing an application-specific EGA driver free of charge, rendering a board's ability to emulate the CGA superfluous.

Another compatibility issue involves Graphic Software Systems' virtual device interface (VDI), which the EGA's BIOS is designed to accommodate (see "The Myth of the Virtual Device," *PCW*, April 1985). IBM supported this software interface to spare programmers the labor of writing multiple drivers for the EGA's many modes; instead, the VDI permits use of a single driver. Even though few programs have been written for the VDI, all the EGA compatibles assessed here include VDI support on board.

One final compatibility question bears mention. Unless your PC's ROM BIOS was written after October 27, 1982, you'll need to install a ROM BIOS Upgrade Kit from IBM before you install an EGA. You can determine which ROM version you have by running the following BASIC program:

```
10   DEF SEG = &HF000
20   FOR I = &HFFF5 TO &HFFFF
30   PRINT CHR$(PEEK(I));
40   NEXT
```

For convenience, some EGA manufacturers include their own program that checks the date of your PC's BIOS.

Compatibles Competition

Defining the exact nature of the EGA compatibles is like aiming at a moving target. Several of the adapters offer various Hercules and CGA emulation options, and each manufacturer is constantly refining its board's BIOS. Consequently, many of the hardware and software problems that cropped up during testing may have been rectified by the time you read this.

AST-3G Model 1 (BIOS revision D) Renowned for its SixPakPlus memory expansion product, AST is the largest supplier of boards for the PC. Like all AST products, the full-size 3G Model 1 is well constructed, uses high-quality components, and is accompanied by lucid documentation. Among EGA emulators, the 3G also offers the most Byzantine array of configurations.

The board comes in two basic versions: the $450 Model 1, and the $500 Plus, which (although unavailable for review at press time) claims to add partial CGA and HGC emulation. If you purchase a Model 1 and later decide you want the Plus's added capabilities, an upgrade kit is available for $75. Either board is narrow enough to clear the stacked memory chips in older ATs and thereby fit in any full-length slot.

The AST boards are unique in that both basic versions come with only 64K of RAM. Buying the 256K incarnations of the Model 1 or the Plus (which cost $525 and $575, respectively) is definitely the route to follow, because the separate memory enhancement kit costs twice as much as the same amount of factory-installed RAM. The maxim applies as well to the parallel port option—buy it built in and you'll save $25 on the price of an add-on kit.

As with the SixPakPlus, you can't use the rear bracket of the 3G to mount the parallel port; instead, you must run a ribbon cable from the board's internal connector to an external connector mounted on another bracket. You can configure the parallel port as LPT1 or disable it using the jumper on board. If you already have a parallel port, the 3G's port can be configured as LPT2 or LPT3 or can be disabled.

The 3G is the only board tested that omits the EGA's light-pen connector. Otherwise, the 3G is fully EGA compatible, performing smooth scrolling, panning, and split-screen functions without difficulty. Unlike the boards that reduce the complexity of purchasing an EGA, however, the AST-3G adds confusion with a tangled web of price breaks and options.

ATronics International (ATI) MegaGraph Plus (BIOS revision 1.03H) Like AST's entry, the basic model MegaGraph is EGA compatible only; CGA and HGC emulation are available in a Plus version for an extra $50. The half-size MegaGraph Plus reviewed here appears to be superbly constructed; most components are affixed via surface mounting (that is, no sockets). While this technology makes repairs more difficult, it tends to ensure reliable connections.

Of the boards tested, the MegaGraph Plus provides the easiest method of invoking CGA or HGC emulation. If your PC is hooked up to an IBM Enhanced Color Display, for example, pressing <F2> when starting your system turns on CGA emulation. With a monochrome monitor, the MegaGraph's Hercules emulation kicks in via the same procedure. Because this approach doesn't use DOS software, you can use the board with any operating system.

Despite these niceties, the MegaGraph Plus's current EGA impersonation is second-rate. When scrolling and panning, the display jumps crazily. And with fast-moving, 640-by-350-pixel-resolution graphics—such as those provided by some slide-show animation software—the board fails to maintain coherent video memory, causing splotches of color to accumulate on screen. In CGA emulation mode, the board fares better: Unlike any other board tested, the MegaGraph Plus actually runs subLogic's *Night Mission Pinball,* although it appears in monochrome rather than in color.

The MegaGraph Plus's lackluster documentation doesn't exactly inspire confidence. The installation instructions are cursory and offer few illustrations, and a dim photocopy supplies vital update information. All in all, the MegaGraph Plus has some appealing attributes and superior CGA emulation, but the current version's rough edges prevent it from being a winner.

Basic Time EGA (BIOS version 1) The Basic Time EGA is the least expensive board evaluated here, tipping the register at a mere $349. This full-length adapter doesn't offer CGA or Hercules emulation but proves its mettle admirably when emulating the EGA—with one notable exception. When you load *PC Paintbrush,* the Basic Time EGA will implement palette changes saved in a file, but thereafter using a mouse to change palettes is fruitless. The Basic Time board was the only one in our sample to fail this test, which may portend palette problems with other programs.

Given its high performance, full EGA compatibility, and superior documentation, Genoa's Spectra EGA is a class act.

The list price includes a parallel port, which can emulate the port built into IBM's Monochrome Display Adapter (MDA). Because only one MDA parallel port can be active at a time (the MDA parallel port always uses port address 3BC), you can make Basic Time's parallel port emulate that of the IBM Serial/Parallel Adapter if an MDA is already installed. Installation instructions are fairly complete, although for some reason the cryptic terms *in* and *out* are used to describe jumper settings. The board's switch settings are not accessible once the unit is installed.

The dual RCA video jacks and the Feature Connector are not included on the Basic Time EGA, although the manufacturer plans to add them if and when IBM puts them to use. The light-pen connector reveals an annoying oversight: You must clip off pin 2 before you can attach most light-pen cables. For many users, however, the board's low price will excuse the scrimping on details.

Genoa Spectra EGA Model 4800 (BIOS revision 1.10) Given its high performance, full EGA compatibility, and superior documentation, Genoa's Spectra EGA is a class act. Its BIOS routines ran faster than those of any board tested, and the manual is crammed with helpful illustrations. The Spectra performed satisfactorily in all EGA compatibility tests. Considering that the board does not implement partial CGA or Hercules emulation, however, its $599 price tag is high.

The Spectra EGA comes with its own software to override the initial video mode specified by the switch block setting, but execution is sluggish. As with most of the other boards reviewed, you must still open up your PC to move a jumper in order to exchange a Monochrome or Color Display for an Enhanced Color Display.

In an AT with piggybacked 128K memory chips, the full-length board fits comfortably only in the first slot. Both a parallel port and a Feature Connector are on board, although the RCA jacks are missing. You can configure the parallel port as LPT1, LPT2, or LPT3, or you can disable it. As a

small bonus, the board's utility disk offers a program that checks the PC's BIOS ROM date.

Quadram QuadEGA+/Video 7 Vega (BIOS 04B) Video 7 was the first company to release an EGA-compatible board, partly because it worked with Chips and Technologies to help develop the EGA chip set. A small firm, Video 7 decided to market its EGA compatible, the Vega, through Quadram under the QuadEGA+ moniker. Due to Quadram's large number of distributors and early entry into the market, the QuadEGA+ is currently the largest selling EGA compatible.

The Vega and the QuadEGA+ are absolutely identical, manufactured in the same facility and offering the same hardware, circuitry, and BIOS. Both come in long and short versions; both are sold for the same price and provide identical capabilities, including CGA and Hercules emulation. When emulating the EGA, the QuadEGA+/Vega performs flawlessly.

The QuadEGA+/Vega provides one convenience missing from any other board evaluated. Instead of using an internal jumper that you must change when swapping a monochrome or standard color monitor for an enhanced color display, the QuadEGA+/Vega provides an external toggle switch. Given that you can damage a monitor connected to a board that's improperly set, this commonsense feature could be a money saver for those who swap monitors often.

Like several other boards, the QuadEGA+/Vega uses software to invoke CGA and HGC emulation. This program also contains a screen-blanker function that extinguishes the display after a designated period of keyboard inactivity. Such a capability extends monitor life by minimizing burning of the screen's phosphors. Pressing any key recalls the image. The disk also includes a utility to check your system's ROM date, plus a diagnostics program that's enhanced by the manual's excellent discussion of troubleshooting.

Overall, the QuadEGA+/Vega offers one of the best CGA impersonations. Like the MegaGraph Plus, the QuadEGA+/Vega can run *1-2-3* release 1A's graphics, but without the ATI board's EGA emulation problems. Thanks to an early start, Video 7 is several ROM upgrades ahead of the pack, coupling its software superiority with a well-constructed, reasonably priced board.

SigmaEGA (BIOS revision 1.06) Sigma is best known for its Color 400 board, designed to drive high-res, 400-line monitors. Currently, the company is attacking the EGA market with two products—the $595 SigmaEGA, which is both EGA and Hercules compatible, and the $545 Color 350, a garden-variety EGA clone. A version incorporating CGA emulation may be in the works. For now, the SigmaEGA passes its EGA and Hercules compatibility tests with flying colors.

For the most part, the documentation is adequate, but it's a little thin when describing board installation. Fortunately, the SigmaEGA's diminutive dimensions let it slip easily into any PC slot.

Sigma sells an optional composite-video piggyback board that enables you to use the adapter to drive a standard composite color or monochrome monitor. To top it off, the company throws in a copy of *PC Paintbrush* with the SigmaEGA at no extra charge.

STB EGA Plus (BIOS revision 1.07) The EGA Plus is another EGA compatible that refrains from attempting Hercules or CGA emulation. For $595, the board includes a parallel port; a battery-powered clock is a $29.95 option. Bundled software includes a RAM disk, a print spooler, and a clock-setting utility.

When emulating the EGA, the STB board has no problem splitting the screen, scrolling, or panning. Alone among the boards

tested, however, the EGA Plus suffers from a phenomenon known as *dither flicker*. Dithered colors are actually blends of the EGA's 16 primary colors, displayed in a checkerboard pattern of dots from two constituent hues. With the EGA Plus, swatches of certain dithered colors produce a rippling, rolling effect on screen, resembling a color monitor that's been turned on while the PC is off. Certain color combinations in text mode also cause flickering around the edges of characters.

STB's documentation is superior to most, offering detailed illustrations that augment installation instructions. Nevertheless, the flicker problem is distracting enough for the board to fall short of the STB mnemonic, which is "simply the best."

The Graphics Continuum

The enhanced graphics standard is claiming a growing share of the PC graphics market, driven by programs such as *Microsoft Windows* that need high resolution to be used effectively. Within this arena, EGA compatibles are selling well, thanks in part to a reported shortage of the IBM board. But don't assume that the current popularity of the EGA standard means it will last forever—or even approach the longevity of IBM's CGA.

Rumor has it that IBM may be decreasing production of the current EGA to set the stage for a new model sporting a 640-by-480-pixel mode. Even more intriguing is Intel's new graphics coprocessor, which, according to Rich Bader, general manager of Intel's Personal Computer Enhancement Operation, will "represent a quantum leap for graphics." Operating in conjunction with the EGA chip set, the Intel processor (dubbed the 82786) reportedly will run five times as fast as the EGA and offer twice the resolution. Furthermore, the 82786's ROM will contain CAD drawing routines plus the Direct Graphics Interface Specification (DGIS), an enhanced, streamlined successor to Graphics Software Systems' VDI that offers comprehensive raster graphics support. The Intel chip's high performance should make the performance decrease incurred by DGIS imperceptible.

Bader reports that 82786-based products will likely be shipping by the end of this year. In light of their advancements, you might be tempted to postpone buying an EGA or a compatible. But regardless of breakneck hardware advances (not to mention the possibility of add-on 82786 upgrades for existing EGA boards), now's the time to jump on the enhanced graphics bandwagon. Take a look at an EGA in action, and you'll wonder how you ever tolerated CGA "quality." And with an EGA compatible, you can move up without breaking your budget. ●

Eric Knorr is an Associate Editor of PC World, *and Karl Koessel is the Technical Editor.*

AST-3G Model 1
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92714
714/863-1333
List price: 64K $450, 256K $525, 256K with parallel port $25 additional, Plus $575

Basic Time EGA
Basic Time, Inc.
3040 Oakmead Village Dr.
Santa Clara, CA 95051
408/727-0877
List price: 256K $349

EGA Plus
STB Systems, Inc.
601 N. Glenville #125
Richardson, TX 75081
214/234-8750
List price: 256K $595

MegaGraph Plus
ATronics Int'l, Inc.
491 Valley Way, Bldg. #1
Milpitas, CA 95035
408/943-6629
List price: 256K $499

QuadEGA +
Quadram
One Quad Way
Norcross, GA 30093
404/923-6666
List price: 256K $595

SigmaEGA
Sigma Designs, Inc.
2023 O'Toole Ave.
San Jose, CA 95131
408/435-1480
List price: 256K $595

Spectra EGA Model 4800
Genoa Systems Corp.
73 E. Trimble Rd.
San Jose, CA 95131
408/945-9720
List price: 256K $599

Vega
Video 7, Inc.
550 Sycamore Dr.
Milpitas, CA 95035
408/943-0101
List price: 256K $595

20/20 Storage

Combining the best features of hard and floppy disk drives in one unit, the Bernoulli Box has become a fixture on thousands of corporate desk tops. The latest, most powerful version, the 20 + 20, offers quick access to 40 megabytes.

Donald B. Trivette

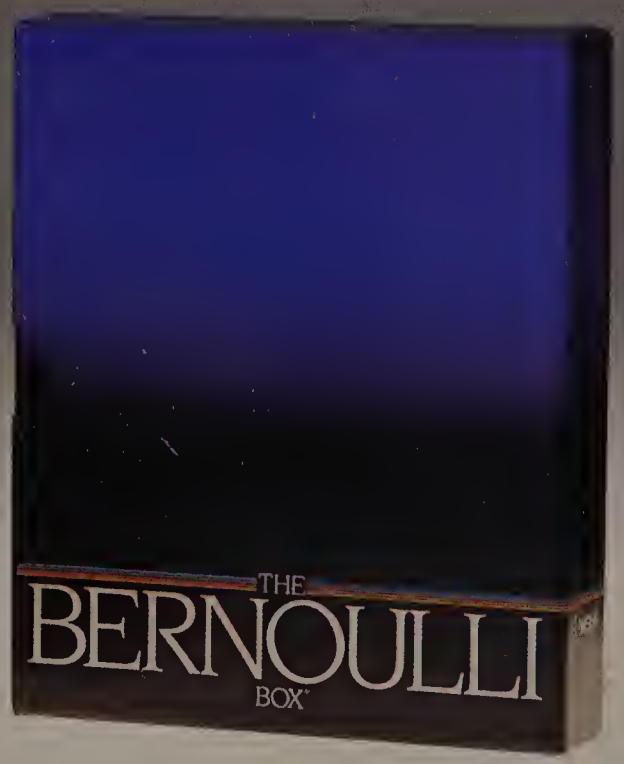
Fred Stimson

What mass-storage device provides virtually unlimited capacity, easy portability, and high-speed operation for personal computers? Clue: Last year this product was voted a World Class PC award by *PC World* readers. The answer is the Iomega Corporation's Bernoulli Box, a unique storage device that has taken corporate America by storm (see the sidebar "Solid Satisfaction" for user comments on earlier models of the Bernoulli Box).

Iomega has married the portability and convenience of a floppy disk to the speed and capacity of a hard disk. The result is the newest model of the Bernoulli Box—a compact external unit styled to complement the PC and measuring 13 inches wide, 7 inches high, and 17 inches deep. (An earlier version of the Bernoulli Box was about twice as large and had cartridges with half the current capacity.) Inside the box are one or two half-height Bernoulli disk drives, a power supply, and a cooling fan. The company sells the unit in four configurations: with one drive of either 10- or 20-megabyte capacity, or with two drives of either capacity. For this review, the dual 20MB version, called the 20 + 20, was tested.

Improving on Two Technologies

Operationally, the Bernoulli Box is almost identical to a floppy disk drive—both use a read/write head to store and retrieve data on the surface of a flexible, magnetic-coated, plastic disk. The Bernoulli disk, however, is enclosed in a ½-inch-thick hard plastic cartridge, approximately the size of an 8½-by-11-inch sheet of paper; the disk itself is 8 inches in diameter.



The Bernoulli Box 20 + 20 is the latest and most capacious of Iomega's line of unique storage devices.

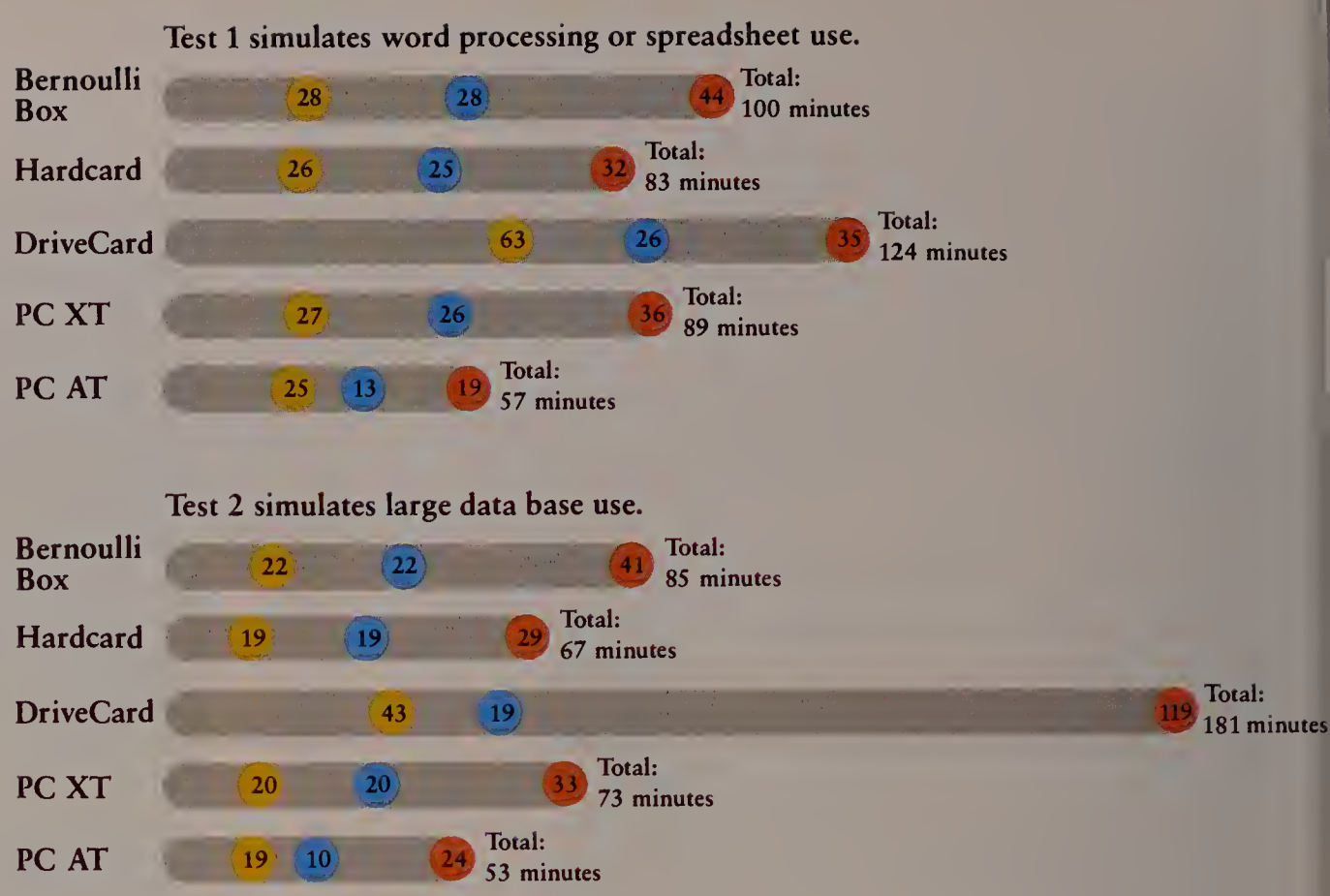
The Bernoulli disk improves on standard floppy drives in two important ways: speed and capacity. Each Bernoulli cartridge has a capacity of up to 20MB, compared to a floppy's 360K to 1.2MB, and the Bernoulli is almost as fast as a hard disk (see Figure 1).

Iomega's innovative disk drive spins the flexible platter at 3000 revolutions per minute (rpm), ten times the speed of a conventional floppy drive. The Iomega disk and drive—as well as the device's name—are based on the work of eighteenth-century Swiss mathematician Daniel Bernoulli, who developed the principle that the pressure in a stream of fluid is reduced as the speed of the flow is increased. (This is the reason a screwball curves, an airplane wing lifts, and a hard disk's read/write head flies.) Iomega found that when a flexible platter spins in close proximity to a rigid, flat surface, it becomes stabilized and behaves as if rigid.

While the Iomega drive resembles a hard disk in speed and storage capacity, it improves on hard disk technology. For example, dust and contaminants are a major problem with hard disks—a tiny speck can send the read/write head crashing into the recording surface and cause loss of data—sometimes even permanent damage to the hard disk. A Bernoulli cartridge is far less susceptible to dirt because the platter retains enough flexibility to deflect tiny particles.

In addition, when the drive is not in use, a stepper motor repositions the read/write head every few seconds to prevent excessive wear in any area should a power failure cause the head to land. (The motor's slight ticking noise may bother some users.)

Figure 1: Bernoulli Box versus hard disks and hard disk cards



Using the Box

Installation of the Bernoulli Box is simple and straightforward. You connect the unit via a 5-foot cable to a short adapter that fits into one of the PC's expansion slots. To install the software, you simply add a line to the DOS CONFIG.SYS file and copy the Bernoulli driver to the start-up disk. Used with an optional adapter available from Iomega, the Bernoulli Box can serve as the start-up disk. Normally, the entire installation takes less than half an hour. In a system with two floppy drives, a dual-drive Bernoulli becomes drives C: and D:; in a system equipped with a hard disk as drive C:, it becomes drives D: and E:.

Most DOS commands, including COPY, CHKDSK, and DIR, work with the Bernoulli drive. Iomega provides a useful utility for backup and restore operations, as well as a special program to format the cartridges. Complete and partial backups are particularly easy with a two-drive Bernoulli Box, because they can be initiated with a single command. Furthermore, the Bernoulli Box runs at roughly half the speed of the AT's hard disk. In one test using the Iomega software, copying 1200 files containing a total of 12.7MB from one cartridge to another took only 30 minutes.

The utility for restoring data from backup media is especially versatile. You can restore the contents of an entire cartridge, complete with the directory structure, or just as easily specify that only a single file be restored.

Proof in the Performance

How well does the Bernoulli Box work? Is speed sacrificed for removable media? To answer these questions, I put the Bernoulli Box through the same two tests that were performed on hard disk cards in "Card Tricks" (*PCW*, June 1986). The results appear in Figure 1. These tests show that the Bernoulli drive is comparable to an XT's hard disk, but, as expected, it is slower than the AT's high-performance drive.

Test 1 simulated typical word processing and spreadsheet activity. The drive had to read and write a 100K file 200 times and then perform 40,000 random reads for an average seek time. As the table shows, the Bernoulli drive's performance was acceptably fast when compared with the times of the XT, Plus Development's 10MB Hardcard, and Mountain Computer's 20MB DriveCard.

Test 2 consisted of reading and writing a 1MB file 15 times, then performing 20,000 random accesses. This test simulates processing a large data base. Again, the

Bernoulli unit's speed was acceptable. No errors were detected during either test.

My only reservations about the Bernoulli Box are minor. The manual, while easy to read and well designed, should explain the backup and restore procedures more thoroughly, and a quieter fan and stepper motor would be an improvement. Finally, Iomega's 90-day warranty seems unnecessarily stingy.

Overall, the Bernoulli Box is a fast, reliable storage device that is well suited for business use and particularly appropriate for applications needing removable media for security, archiving, or mailing megabytes of magnetic memories. The larger storage space offered with the latest models will no doubt add to Iomega's already impressive success.

Donald B. Trivette is a consultant and freelance writer living in Wrightsville Beach, North Carolina.

Bernoulli Box
Iomega Corp.
1815 West 4000 South
Roy, UT 84067
800/556-1234, 800/441-2345
California, 801/778-1000
List price: one 10MB drive $2695, two 10MB drives $3695, one 20MB drive $3295, two 20MB drives $4695; 10MB cartridge $79, 20MB cartridge $99

Solid Satisfaction

The true test of any product is how well it's received by users. In addition to winning the World Class PC award, the Bernoulli Box has won many a corporate heart. Martin Marietta, Pacific Gas and Electric, Hughes Aircraft, Weyerhaeuser, and Boeing are but a few of the Fortune 500 companies using the device. As of last April, more than 200,000 Bernoulli Boxes had been installed.

Alan Lucas, a senior computer systems designer, develops applications for Martin Marietta in Orlando, Florida. "Because my group is involved in the development and coding of communications and advanced graphics software, we use the Bernoulli primarily for program and data storage," Lucas says. "Putting each application along with its data on a separate cartridge makes it easy to ship applications around the company, and everything is better organized."

In two years Lucas has lost only a few sectors of data from Bernoulli cartridges—a far better record than most hard disks achieve. "I'm very happy with them," Lucas says of his company's Bernoulli Boxes, "but the ticking sound the drive makes annoys some of my staff."

Ed Sund is the senior engineer for personal computers at Weyerhaeuser, the huge forest-products company headquartered in Tacoma, Washington. "We use the Bernoulli Box as primary disk storage instead of hard disks," Sund notes. "We put our data bases on one cartridge and application programs on another—that way it's easy for users to switch programs by plugging in a different cartridge."

Weyerhaeuser was an early convert to the Bernoulli Box and now has several hundred throughout the company. Weyerhaeuser personnel often ship cartridges to the firm's many offices in the United States and abroad, but no data has been lost that way. As Sund puts it, "With hard disk technology, if it goes, you're dead. There's never been an occasion when I couldn't get the data back from a Bernoulli." *—D. T.*

XyWrite III: The Taming of the Shrewd

XyWrite III offers advanced windowing, footnoting, autohyphenation, and column formatting—in other words, fast and potent word processing for the consummate writer. However, its attempted rapprochement with RAM-resident software still falls short.

Hal Nieburg

Closer to the writing professional's heart than family and creature comforts are the tools of the trade: a favorite old Parker pen, a beat-up Underwood, and nowadays a reassuring and responsive word processor. For the writer, the choice of a word processor may be as important as the choice of a spouse. Too often, the writing professional weds software, as it were, after the first kiss. Time and energy are invested in learning a program, but, as in a marriage, you don't find out whether the relationship really works until it's too late. Even if the software grows stale and unprofitable, you make the best of it.

Yet no matter how faithful you are to the familiar, temptation may catch you unawares. For me it showed itself beneath a prim and forbidding exterior, but the word processor underneath was possessive, wild, and beautiful. A new version of *XyWrite* is here from Xyquest, dubbed *XyWrite III*. And it may break *WordStar*'s heart.

Beyond Baroque

On the surface *XyWrite III* does not shimmer—the screen displays are plain and dowdy. Despite an overwhelming number of commands to remember, few menus exist to guide you. Most commands must be entered as ASCII strings at the command line, and what you see on screen is a far cry from what prints out. At first, the program seems awkward and baroque; but you have only to strip away this intimidating veneer to find a fast, multifaceted program that makes up in functionality for what it lacks in ease of use.

XyWrite III swiftly carries out almost every function found in today's high-end word processors. It excels in automatic hyphenation, math calculations, outline numbering, macro creation, and mail

merge. The indexing, table of contents, and footnoting routines are elegantly implemented.

One of the many extras in this program is the ability to fill in standard forms or design your own. You can also control page breaks to avoid widows and orphans (single lines separated from their paragraphs). The only major omission is a spelling checker, which Xyquest plans to add in a future release.

If it's personal computer publishing you're after, you've come to the right place. The original *XyWrite* was descended from the Atex typesetting system, and this latest version adds to *XyWrite*'s page layout and typographic prowess. With its column formatting features, microjustification, proportional spacing, and support of laser printers (including PostScript printers), *XyWrite III* is one of the top word processors for PC publishing. You can place up to six newspaper-like columns on a single page using different formats for each, or you can *snake* text through columns so that it wraps from the bottom of one column to the top of the next. The ability to define a protected, spreadsheetlike cell around columnar text is perfect for creating inset boxes that are impervious to the text that flows around them.

Despite its complexity, *XyWrite III* is a flexible partner, enabling you to customize its functions to an unusual degree. All the parameter files are written in ASCII, not hidden in compiled form, making it easier to modify the source code using the program's editor. And the exterior is not nearly as forbidding as it appears at first glance. The program provides a hierarchy of powers: A beginner can turn out finished work in minutes, and an experienced user can acquire increasing facility at performing such feats as customizing keystrokes, writing macros, and changing character sets and fonts.

Residency and Cohabitation

Hard disk users will be pleased that Xyquest has stuck with its original policy of no copy protection. *XyWrite III* provides configurations for 140 different printers, including a number of well-known laser printers, such as the HP LaserJet and the Apple LaserWriter.

Xyquest has vastly improved its documentation with the new release. Aside from the print tutorials and the alphabetical reference work, *XyWrite III* comes with three sets of pop-up help files: one for beginners, one for advanced users, and one for users of previous *XyWrite* versions.

XyWrite II was notorious for its incompatibility with memory-resident software. That increasingly popular software has been locked in mortal combat with *XyWrite II,* which refused to relinquish its jealous grip on the keyboard. In the newest version, the programmers have sought to resolve the struggle by providing alternate keyboard strategies. Xyquest concedes that you can run less than 10 percent of available RAM-resident software using the native *XyWrite* keyboard configuration. In tests of

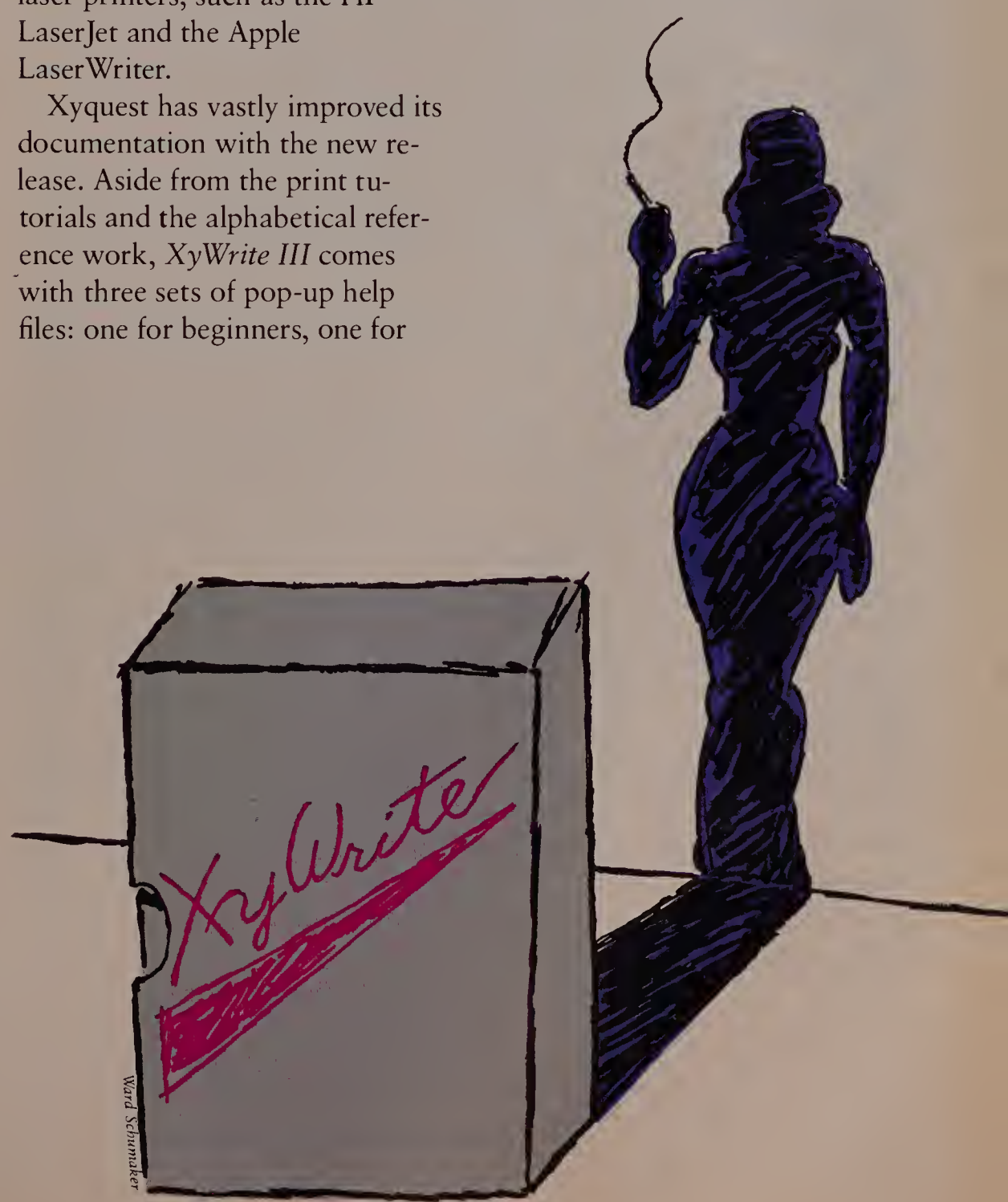


Table 1: RAM-resident compatibility with XyWrite III's three keyboard drivers, from a sampling of 14 programs

	IBM.KBD (10 percent solution, default keyboard)	XYKBD.COM (80 percent solution, no degradation)	DOS.KBD (100 percent solution, system degradation)
HomeBase, Amber Systems		●	●
Keyworks, Alpha Software		●	●
PC Tools, Central Point Software	●	●	●
PolyWindows Desk, Polytron			●
PopUp Deskset, Bellsoft		●	●
ProKey, RoseSoft			●
Ready, Living Videotext		●	●
Reference Set, Reference Software			●
SideKick 1.56, Borland International	●	●	●
SmartKey, Software Research Technology		●	●
Spotlight, Lotus Development		●	●
SuperKey, Borland International			●
Turbo Lightning, Borland International		●	●
Word Finder, Writing Consultants		●	●

14 RAM-resident programs, only *PC Tools* and *SideKick 1.56* ran with *XyWrite III* (see Table 1). However, Xyquest claims that by loading a second set of keyboard parameters called XYKBD.COM, you can run 80 percent of RAM-resident software. In my tests, the only programs that couldn't run were *Reference Set, SuperKey, ProKey,* and *PolyWindows Desk.*

A third keyboard option (DOS.KBD) supposedly runs 100 percent of RAM-resident software, a claim that my tests confirmed. Unfortunately, with this keyboard configuration, *XyWrite III*'s functionality declines considerably. The option disables all commands that require multiple shift keys—more than one-third of the program's features. For example, all help files are inaccessible, cursor movement becomes erratic, and you can't use the search and replace feature. Considering that this 100 percent solution cripples the program, it's hardly worth it. However, most users should be satisfied with the 80 percent solution, which causes no decline in performance or functionality.

Speed Is of the Essence

Programmed in assembly language, *XyWrite* has always stood out as one of the fastest word processors around. The latest version is no different. I tested *XyWrite III* against Quicksoft's *PC-Write* version 2.55 (another speed demon) and MicroPro's slower *WordStar* version 3.3. The tests in Table 2 were performed on an XT traveling at 4.77MHz with a 60K file.

As Table 2 indicates, *PC-Write* shows a slight advantage in two of the tests, but it is not a fully imple-

mented word processor. The fact that *XyWrite III* is in the same speed league and is so comprehensive a program places it squarely in the world class for celerity.

Table 2: Speed performance tests for common word processing functions (in seconds)[1]

	Load	Move from beginning to end of file	Save to disk
XyWrite III	8.2	2.0	10.5
PC-Write	12.6	1.0	7.2
WordStar	13.2	32.9	33.9

[1] Tests used a 60K file in a 360K floppy disk drive.

The Merry Window Waltz

Combining such speed with multiple buffers and windowing makes *XyWrite III* almost as responsive as the user's own nerve endings. The program permits nine windows to be used simultaneously, allowing instantaneous switching and block movements from one to another. Pressing <Ctrl>-<F10> calls forth a pop-up menu for managing windows (see Screen 1). All the windows can be moved and sized by entering the appropriate command, then using the cursor keys. Screen 2 displays windows on the four files listed on the menu in Screen 1.

If you frequently use windows, you can install a special "super keyboard" driver that speeds the windowing process even further. <CapsLock> becomes a toggle that turns the numeric pad into a window manager, allowing selection of and movement among windows with single keystrokes. Unfortunately, the super keyboard prohibits you from using any memory-resident software.

Happy Hyphenation

Whether you prefer ragged-right or justified text, *XyWrite III*'s automatic hyphenation function handles the job easily. In hyphenation mode, the text continuously rearranges itself as you edit, mending or breaking words correctly at the end of each line. There are no delays or squiggles in moving the text and no lag in displaying keystrokes on the screen.

The hyphenation system follows a built-in set of word-breaking rules, including a 1200-word dictionary of exceptions (when it is proper to break between double consonants, for example). Anytime a word breaks incorrectly, you can add it to the dictionary with hyphens between the syllables. After I spent several hours setting up 100 uncommon words on the right margin, only 4 broke incorrectly.

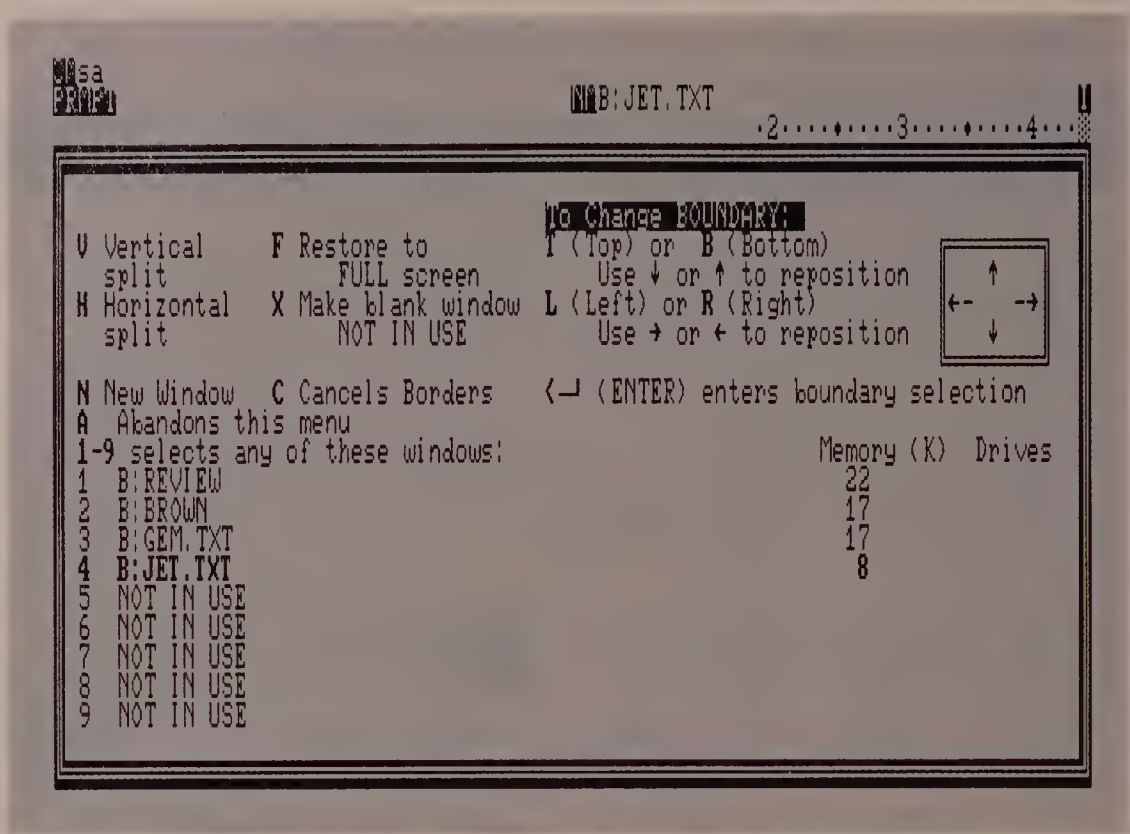
The program prints with micro-justification and proportional spacing. The former adjusts the spaces separating words, using fractions of whole spaces. The latter allots space to each letter according to that letter's width; a *W* takes more space than an *l*. These touches lend a professional and finished look to the page, making the text easier to read. Taken together with the autohyphenation capabilities, these features permit evenly spaced, right-justified full lines, just as in old-fashioned, manual linotype composition.

Columns and Cells

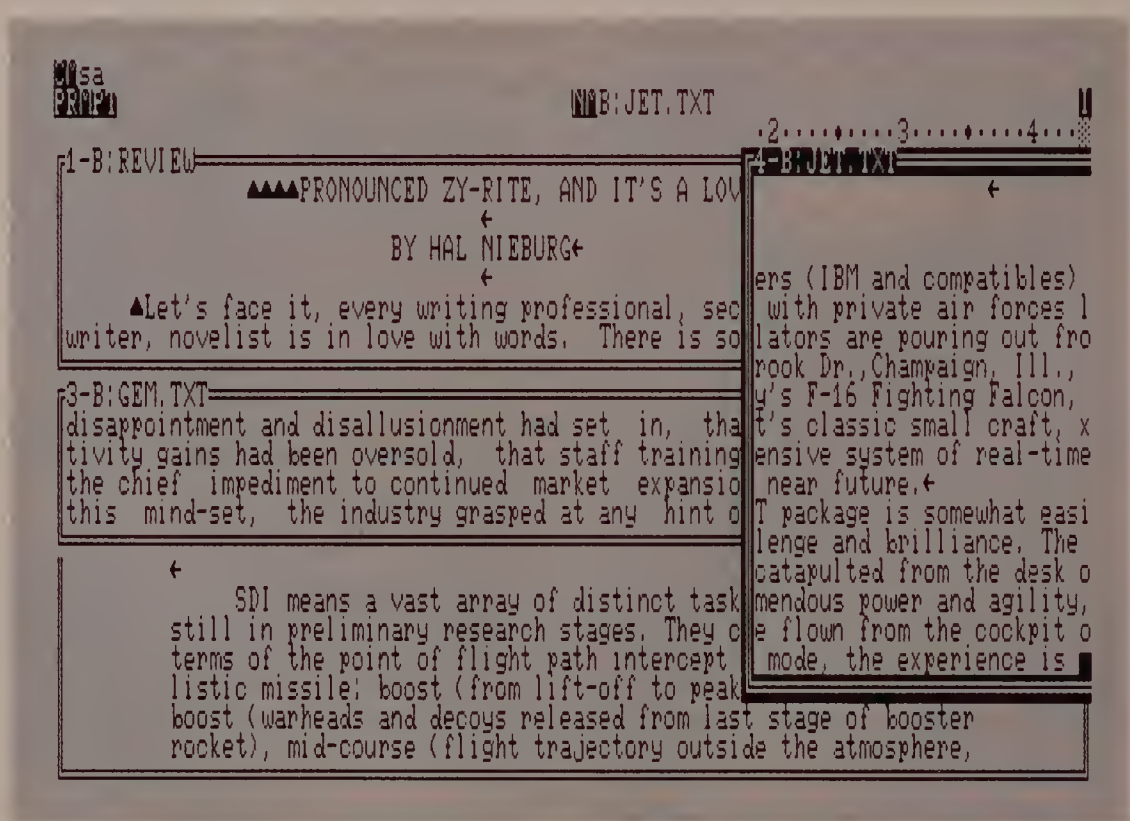
XyWrite III implements two kinds of columns: newspaper-like and tabular. Newspaper-style columns allow you to snake text through up to six columns. The text automatically reformats when you make additions or deletions.

Few word processors are able to control vertical as well as horizontal formatting. *XyWrite III*'s ability to format in spreadsheetlike cells and columns makes the program especially appealing for publications and newsletters, but it is also useful for business reports and other office documents. It is great for handling blocks of text, such as lists, calendars, appointment books, and even screenplays (with stage directions and dialogue in separate columns).

Columnar tables are like spreadsheets for text. You can create up to 16 columns on screen with as many text entries in a column as desired. Text can be added or deleted in any cell without disturbing other cells. To break text into columns, you set up a table with the CT command and enter the left margin offset, followed by the column width. Then type in the



Screen 1: One of XyWrite III's few menus displays commands for managing up to nine windows. Here, four files are loaded into memory buffers. Their size in kilobytes is displayed on the right.



Screen 2: XyWrite III's windows in action. A special super keyboard can be installed that turns the cursor pad into a fast window manager.

text, using a right or left cursor key to move from column to column. Each column formats separately on the screen, with either right justification or a ragged right margin.

Cool and Calculating

You can use four different methods for math operations. The most direct way, called a header calculation, is to enter the arithmetic operation on the command line. You can also add or subtract numbers and expressions that are already entered in the body of the text by moving the cursor to a number and pressing <Alt>-<GrayPlus> or <Alt>-<GrayMinus>. As you go from number to number, indicating add or subtract, the cumulative result appears on the prompt line. When you're finished, move the cursor to where you want to print the result; the same command prints the number and clears the internal buffer.

In the third mathematical option, you mark a block in a row or column and press <Alt>-<GrayPlus>. The sum appears in the prompt line and can be pasted in at the cursor position with the <Alt>-= command. Lastly, an expression (such as 3*4½) can be evaluated right in the text. Mark it and use <Alt>-<GrayPlus>, then press <Alt>-= to paste the answer in at the cursor position.

A Footnote to Success

XyWrite III's footnoting and endnoting capabilities equal those of any PC word processing program. To insert a footnote, move the cursor to where you wish the superscript number to appear in the text, type FN in the command line, and press

<Enter>. A window opens on the screen. Type in the material and press <F3>. A highlighted or inverse-video number appears in the text, and the actual note is copied into a buffer.

You can freely insert or delete such notes at any time; the program will automatically number them in correct sequence regardless of the order of entry. Pressing <Ctrl>-<F9> reveals the formatting symbols along with the footnote text; you can edit the footnotes using normal editing commands. This expanded mode enables advanced users to edit all embedded commands, not just footnotes.

Minor Annoyances

Aside from the RAM-resident snafu, the principal annoyance I experienced with *XyWrite III* involved the management of memory. *XyWrite III* enables you to dump files directly into RAM, so multiple files can be loaded simultaneously and displayed in windows. The program will run on 256K, but just barely. No user will want less than 512K, and even 640K begins to constrict your ability to keep several large files in memory simultaneously. Fortunately, Xyquest plans to implement the EMS (expanded memory specification) before the end of the year. Together with an expanded memory board, this will make the windowing environment even more powerful, and hopefully, the buffer limit will be eliminated.

Finally, a few picky complaints: I would like more single-stroke cursor movements, such as to the end of a word or to the beginning and end of a sentence or paragraph. My wish list also includes tag lines on the top of screens to tell me when marked blocks are currently in a buffer, which full-screen window is active at any given moment, and which drive is the default. It would be nice to be able to close all the windows with one command, and it would be handier if windows came up on the screen at less than full size, so you wouldn't always have to resize them.

Made in Heaven?

Prior to this latest version, I had dismissed *XyWrite* because of its forbidding external appearance. I knew that people with outstanding credentials thought highly of it. The American Association for the Advancement of Science, the umbrella organization of all scientific societies in the nation, has adopted *XyWrite II*. The prestigious Modern Language Association has endorsed a derivative version of *XyWrite* called *Nota Bene*, which adds foreign language support, text data management, and other academically oriented extras (see "Notable Nota Bene," *PCW*, March 1986).

Although the update policy is rather steep, I can't imagine former *XyWrite* devotees changing their allegiance. Without sacrificing performance, Xyquest has kept up with other high-end competitors and in some features has surpassed them. With its windows, hyphenation, footnoting, and column formatting features, not to mention its lightning speed, *XyWrite III* constitutes a swift and forceful writing program.

Among users looking to the *XyWrite* world for the first time, opinions may vary. For writing professionals who ask for the moon and the stars from their word processor, *XyWrite III* has but a small handful of valid competitors. However, many users may not want to spend their nights mastering this mammoth program. And if your favorite RAM-resident program is one of those incompatible with the 80 percent keyboard solution, *XyWrite III* probably isn't worth the trouble of learning.

So am I smitten? Although this new version is getting under my skin, I am not yet ready for a permanent commitment. Still, after this delightful escapade with *XyWrite III*, I think, in the immortal words of Elaine May, "We are going to have a relationship . . . "

Hal Nieburg is a freelance writer who teaches at the State University of New York at Binghamton.

XyWrite III
Xyquest, Inc.
P.O. Box 372
Bedford, MA 01730
617/275-4439
List price: $395; update from XyWrite II to III $200, from XyWrite II-Plus to III $100
Requirements: 256K, one disk drive, DOS 2.00 or later version

Scanners: Gaining Recognition

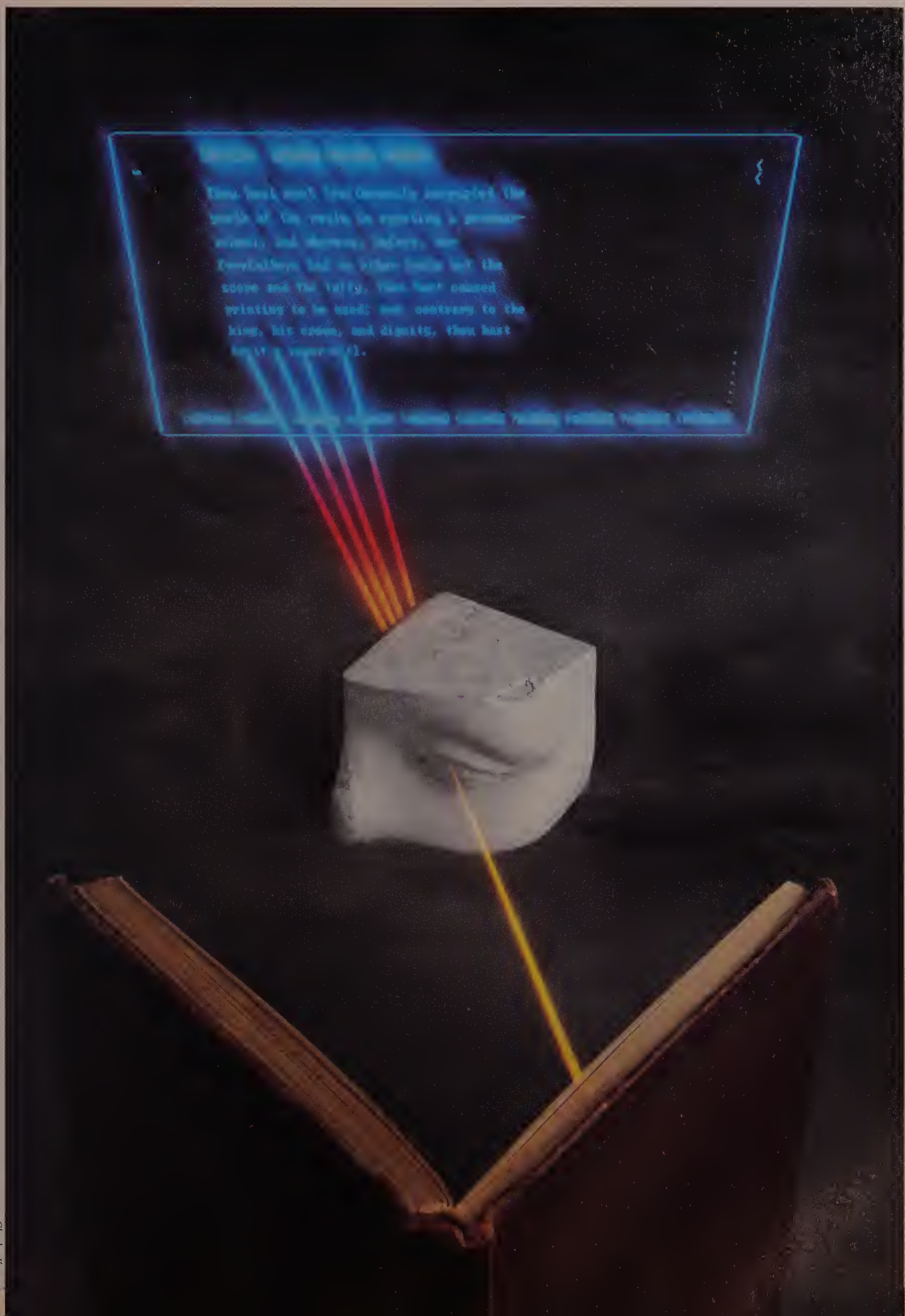
Hardware for optical character recognition has evolved quickly in recent years; improvements in software must now follow suit. OCR scanners from Dest, Microtek, and Datacopy lead a new wave of desk-top readers.

Bill Crider

Computer users like to get things done fast, but they often find themselves mired in computing logjams. Although hard disks and RAM disks have increased disk access speed, and laser printers and print spoolers have streamlined the printing process, users can easily get stuck in the keyboard bottleneck. But help has finally arrived with the latest generation of optical character readers. No longer must the user type in the data; the PC can now read directly from printed pages using image scanner hardware and optical character recognition (OCR) software.

Hardware for OCR has existed for more than a century. In 1870 Boston inventor C. R. Carey used photocells to recognize characters. Then, in the 1890s, devices to convert type into Morse code reached the market. Reliable electronic scanners appeared in the 1950s. Bell Labs and IBM became interested in OCR during that decade and developed readers that worked with mainframes for government and corporate use.

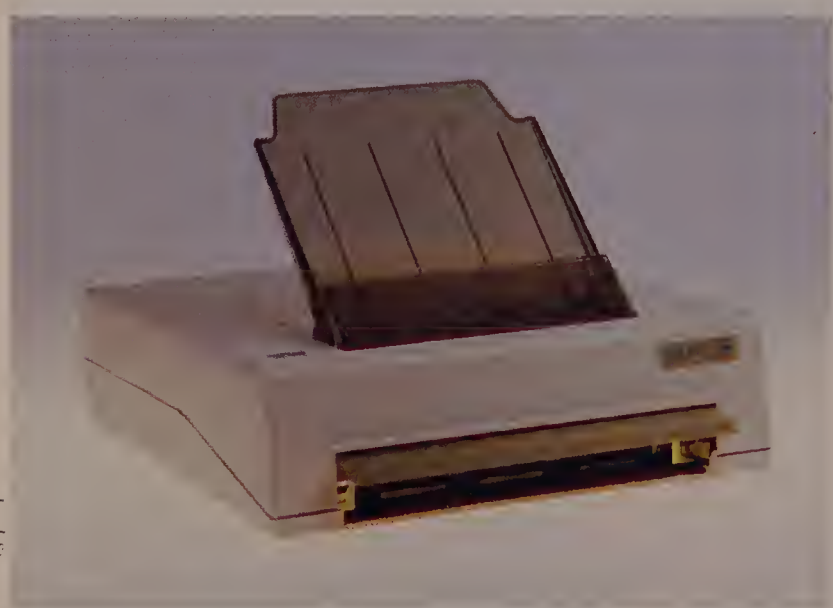
OCR is nothing new to retail automation; special machine-readable typefaces have been available for most typewriters since the 1960s. Checks carry magnetic ink character recognition (MICR) type that enables banks' computers to read the account numbers automatically.



Charles Kemper

Because of OCR's high costs, unreliability, and inflexibility, only large companies requiring special applications have been suitable candidates for scanning technology. Optical recognition veterans such as Kurzweil Computer Products have marketed products costing hundreds of thousands of dollars. More recently, Dest Corporation, Hendrix Technologies, and Totec Company have offered products in the $10,000-to-$50,000 range.

Reliability has always been a particularly thorny problem. Until last year OCR readers were able to achieve only 99 percent reliability—which may sound good, but it means approximately 15 errors per page. Also, conventional OCR has been limited to one or two typefaces per machine. Typeface recognition software is typically burned into a ROM or PROM chip and cannot be changed. Until quite recently, documents had to be specially prepared for input into an OCR reader. Few OCR machines could read the proportionally spaced text that is typeset for books and magazines. And before they were downsized for the desk top, OCR readers were bulky—another obstacle to widespread popularity.



Fred Simson

Microtek's MS-200 is fast and accurate at scanning images or text. Using OCR Systems' software, it is possible to scan just a portion of a page if necessary.

Fred Simson

The PC-Scan from Dest Corporation is compact and easy to use. RAM-resident software provides the ability to scan data directly into an application.

Of Flatbeds and Photocells

Last year saw the arrival of flatbed scanners that could digitize any image (including a page of text) and transmit it, pixel by pixel, to a PC. Scanners resemble small photocopiers: When an image is exposed to the scanner's bright light, photoelectric cells register the reflection and convert it into pixels that recognition software can interpret.

Flatbed scanners have a few inherent problems. Although far smaller than previous OCR hardware, some are still bulky by desk-top standards. The mechanism that moves the light (or mirror) across the page and the surface where the paper is placed make it difficult to reduce that bulk.

Microprocessor technology has produced a new generation of smaller, faster, more dependable OCR scanners, as exemplified by the Microtek MS-200 and the Dest PC-Scan (see the sidebar "A Survey of Scanners"). Rather than use a flatbed for the document, these scanners keep the light and photosensitive cells stationary and feed the document past them. Without their predecessors' bulk, these scanners resemble small dot matrix printers.

Deciphering OCR

Current techniques for character recognition fall into two categories: matrix matching and topological, or shape, analysis. Matrix-matching algorithms have been in use for decades. Imagine holding two photographic slides up to a light, one atop the other. If the same picture appears on both slides, they will match; if they don't, you can immediately spot the differences.

Computers perform this test to interpret bit images. Each character in a font or typeface comprises a set of dots, similar to a character on a computer

screen. Each letter in a scanned image is converted to pixels and compared to a set of bit images in the computer's memory. If none are identical, the computer performs a series of statistical analyses to find the closest match. If none of the statistical comparisons come within acceptable range, the character is considered unreadable.

Shape analysis breaks a character into a few primitive shapes, such as circles, arcs, and lines. The computer then uses a set of rules to determine which character best matches the primitives. For example, a vertical line followed by a circle might be a lowercase *b*, a descending vertical line followed by a circle could be a *p*, a circle followed by a vertical line is likely to be a *d*, and so forth. In practice, this method still relies on statistical analysis to find the best match and inevitably classifies some letters as unrecognizable.

Errors can be divided into three categories: case errors, unrecognized-character errors, and errors of misinterpretation. Case errors commonly occur with letters that have similar uppercase and lowercase forms, like *w* and *v*. Unrecognized-character errors usually involve more complex letters, such as *g* and *a*. Most systems flag unrecognized characters with a symbol, perhaps an asterisk or a pound sign. Misinterpretation confuses characters that look alike—for example, the letter *l* with the numeral *1*, and the uppercase *s* with the number *5*. Because these errors are the hardest for a human proofreader to catch, they are the most insidious.

Nobody's Purfict

Even the best scanner must struggle with photocopies, smudges, font changes, multiple columns, and different type sizes. What can you do to improve the accuracy of scanning? Use an original or the best copy available. Erase any smudges or stray marks—but don't use white-out, which fouls up the scanning mechanism.

A memory-resident, context-sensitive spelling checker would go a long way toward eliminating the inefficiencies of scanning software. It is unfortunate that products like *Turbo Lightning* conflict with scanner software. But because even the best spelling checker cannot determine the accuracy of numbers or punctuation, the human proofreader is not yet an endangered species.

Since many of the most desirable features in a good OCR system have yet to be developed, anticipating the future of scanners is not difficult. In the hardware category, look for scanners that use a parallel or a serial port instead of a separate interface board. Scanning units will get smaller as well; the practical lower limit is about a foot wide by an inch thick.

As scanning software becomes hardware-independent, scanners may become generic equipment, like printers. Memory-resident software for OCR will enable users to scan data directly into applications. Many companies will follow the lead of Datacopy, which produces "trainable" software. The ability to identify and scan a frame on a page will save time, as will the capability to define formats for multiple word-processor formats. The scanner will be able to search for a text string, begin accepting text when it finds the string, and continue scanning until reaching another user-specified string.

Tomorrow's smart software will be able to identify and accommodate a wide range of font sizes. (Current implementations are limited to six or eight lines per inch.) Good scanning software must also be able to scan and identify text in multiple columns.

Computer Vision

We like to imagine that the paperless office is just around the corner. For now, we need the ability to move information from paper to the computer. Perhaps in the distant future when we are simply loading our thoughts into the computer, today's scanner technology will seem quaint. But right now, OCR scanners are providing the best available solution to the keyboard bottleneck.

Bill Crider, a computer training consultant, is president of the Tucson Computer Society and a Contributing Editor for PC World.

(continues)

A Survey of Scanners

As alternative input devices, scanners continue to improve, but if you need one now there's no reason to delay.

Microtek MS-200

A relative newcomer to the OCR field, Microtek makes compact scanners designed primarily for image capture. To use the MS-200 for OCR, you need OCR Systems' program *OCR*, a good example of topological analysis software that can recognize eight fonts and handle unlimited font changes per line. The software also frames and reads a portion of a page, which can speed up reading considerably.

The current version of the OCR Systems software tends to make case errors (about 5 per page). In practice *OCR* averaged 7.5 errors on a test page of 2979 characters for an accuracy rate of 99.9974 percent (see Table A for a comparison of speed and accuracy on the two units available at press time: the Microtek MS-200 and the Dest PC-Scan).

Microtek's EyeStar software is designed to scan images as well as text, allow some manipulation (such as scaling and clipping), and print the scanned images with text files. Simply arrange the text with a window to accommodate an image, put an image marker in the text, and print. An image marker consists of a caret, a bracket, and the name of the image file (e.g., ^[MYPIC.IMG). The program is designed for a Cordata LP-300 laser printer but will also work with the Canon LBP-8 or Epson FX-100.

Table A: OCR tests for speed and accuracy*

	Dest PC-Scan	Microtek MS-200
Prestige Elite		
Time in minutes	1:07.70	1:51.96
Case errors	0	0
Unrecognized	1	2
Misinterpreted	1	4
Courier Pica		
Time in minutes	1:18.02	1:55.31
Case errors	0	11
Unrecognized	4	0
Misinterpreted	4	0

*Test manuscript with 2979 characters

PC-Scan

The PC-Scan, the latest Dest product, is a jewel. By far the smallest of the OCR readers on the market, the PC-Scan is designed to sit between monitor and computer. Only 4 inches high, it seems to occupy no space at all and is extremely easy to hook up and use.

The PC-Scan's slickest feature is its ability to project scanned data straight into an application program. The *TextPac* software is memory resident—just load a word processor and begin scanning. The scanned text is read into the document at the cursor position. Dest's smart product can also insert control codes (for underlining, centering, and so forth) if you are using *DisplayWrite 3*, *MultiMate*, *WordStar*, or *WordStar 2000*.

Averaging just 72 seconds per page, the PC-Scan is fast and accurate. It averages 2 unrecognized-character errors, 1.25 misinterpretation errors, and no case errors per page. An overall average of 3.25 errors per page

makes this scanner 99.9989 percent accurate—a standard likely to impress even a legal secretary.

Datacopy Model 730

Although the Datacopy Model 730 has neither the speed nor the accuracy of the Dest or Microtek scanners, it does have a knack for learning new typefaces. The Model 730 comes with standard fonts, but you can train the unit to read other typefaces—and much more.

To make the scanner read italics, for example, you must create a page of text in italics and then load Datacopy's *Expert* software. When the scanner finds a character it does not recognize, the bit-map representation of the character appears on the screen. You then key in the character, and the software begins the learning process. Once you have entered a character 5 or 10 times, the program usually stops asking for help, but more complex characters may require as many as 20 to 30 repetitions. The Model 730 is also notable for its image manipulator, *Word Image Processing System (WIPS)*, among the most powerful image capture programs on the market.

Datacopy also offers a lower-priced scanner, the JetReader, which features a 10-page document feeder. The JetReader recognizes 13 fonts and comes with both *Expert*—the trainable OCR software—and *WIPS*. The Datacopy JetReader accepts only single sheets or sheets in stacks of ten. If you're scanning from a book, the Datacopy 730 is the way to go.
—*B. C.*

JetReader
Datacopy Corp.
List price: with WIPS and OCR software $2950
Requirements: 640K, Hercules Graphics Card

Model 730
Datacopy Corp.
1215 Terra Bella Ave.
Mountain View, CA 94043
415/965-7900
List price: with WIPS $4950
Requirements: 640K, Hercules Graphics Card

MS-200
Microtek Lab, Inc.
16901 S. Western Ave.
Gardena, CA 90247
213/321-2121
List price: with EyeStar 200 $1700
Requirements: 256K, one disk drive

OCR (software)
OCR Systems, Inc.
3430 Progress Dr., Ste. I
I-95 Industrial Park
Bensalem, PA 19020
215/638-2174
List price: $595
Requirements: 256K, one disk drive, Microtek or Canon scanner

PC-Scan
Dest Corp.
1201 Cadillac Ct.
Milpitas, CA 95035
408/946-7100
List price: $1995, TextPac software $595
Requirements: 256K

Windows on Publishing

Your recipe for corporate personal publishing needn't include the extra expense of the Apple Macintosh and LaserWriter. With Microsoft Windows and a smattering of inexpensive programs, your PC and HP LaserJet can make beautiful pages together.

Nancy Andrews

Personal computer publishing on the PC is in its infancy, but with Microsoft's *Windows* and *Windows Write*, Micrografx's *Windows Draw*, and the Hewlett-Packard LaserJet Plus, you can readily create eye-catching newsletters, reports, and other documents. If your company already uses the LaserJet Plus, the additional investment is modest ($99 for *Windows* and *Write*, $199 for *Draw*); if you have a working familiarity with the *Windows* environment and *Write*, getting up to speed with *Draw* will take but a few hours.

To better fathom the possibilities, consider the steps involved in creating *The Printed Circuit*, a two-page newsletter for the employees of Mythical Corporation, vaporware manufacturer par excellence (see Figure 1). In this example, *Draw* plays the dual role of graphics generator and pasteup board. Key design elements (masthead, borders, subheadings) are first created and laid out in *Draw;* text prepared in *Write* and a graph

produced by *1-2-3* are then imported into *Draw*. The finished product is printed at 300 dots per inch (dpi) on a LaserJet Plus. Almost everything on the first page of the newsletter—including text—is a graphic. As a result, pasteup is much easier and printed output more elegant; printing time, however, is considerably slowed. On the second page, hand-drawn pictures are accompanied by standard text produced with a LaserJet font cartridge.

Lights, Camera, Masthead! *Draw* is well equipped for simple page composition. The program's grid and horizontal and vertical rulers make it easy to line up columns of text and graphics. You can drag images around, rotate them, enter characters directly from the keyboard, and generate any number of geometric shapes. As you paste up the page, you can step back and look at it or at all your pages, display an enlarged section of a page with the Actual Size command, or use Zoom for scrutinizing details. In this application, most of the work will be done at Actual Size or Current Page.

Before getting started with *Windows,* you must determine the overall layout of the newsletter. In this case, *The Printed Circuit* has a masthead running vertically along the right side of the first page. The feature article is pasted up in a single-column format and illustrated with a bar chart; page 2 switches to a two-column format for news and announcements.

Load *Draw* from the MS-DOS Executive window, and select Current Page from the View menu. Before typing in the masthead, you must choose the font, attributes, and point size. *Draw* offers both graphics fonts and standard, bit-mapped fonts. Graphics fonts can be scaled, flipped, and rotated, and are generally used when large type and malleability are needed. *Draw*'s standard text fonts are immutable, are sharpest

in 8, 10, and 12 points, and are commonly used for long passages of text. Because text fonts aren't "drawn" like graphics fonts and thus require less memory, text is displayed and printed faster than graphics.

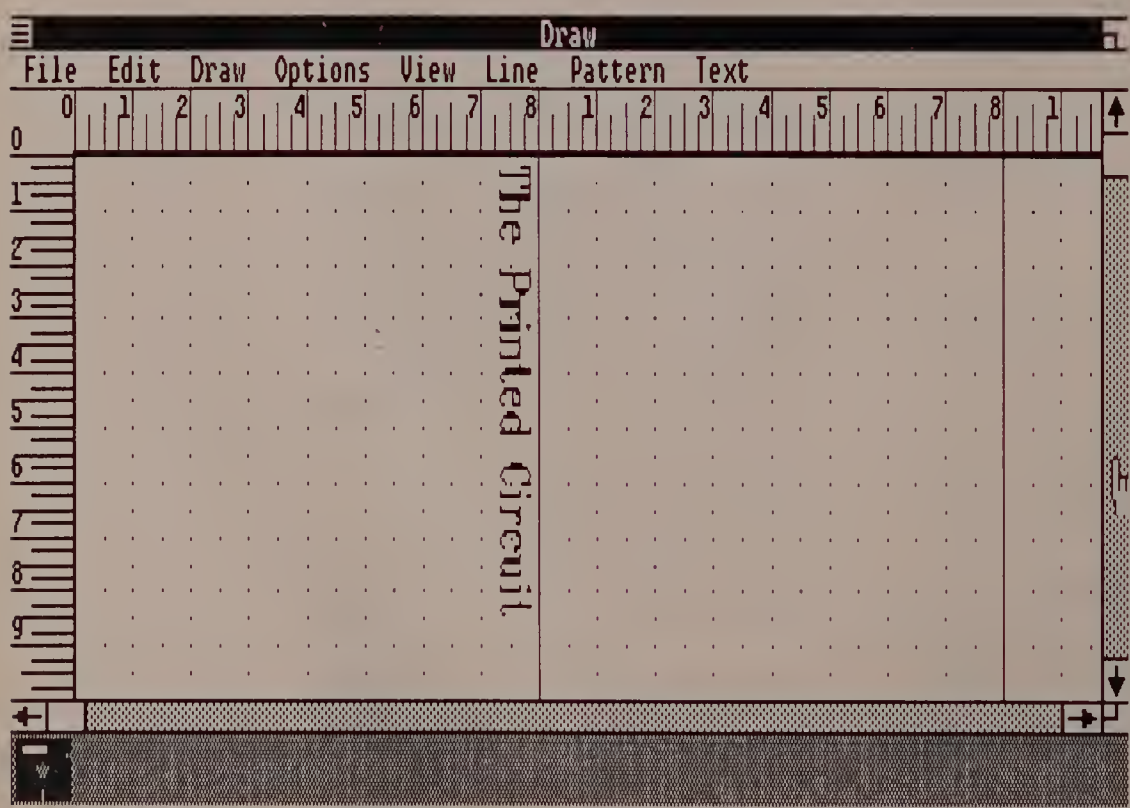
When text set in a standard font is printed, *Draw* looks for the corresponding LaserJet cartridge or internal font. If it fails to find a match, the program either substitutes another LaserJet font or creates a memory-hogging graphics font. Since LaserJet memory is always at a premium—particularly when 300-dpi graphics are being printed—make sure that standard text fonts specified in a *Draw* file match those in the LaserJet. Otherwise, the LaserJet may present you with a partially printed page—and an 'out of memory' message.

Because the first page of the newsletter will include only one memory-intensive graphic—a *1-2-3* bar chart—you can get away with using graphics fonts for the masthead, headlines, and the body of the newsletter. Only a small section of the masthead will require the standard text font.

From the Text menu, select the Roman graphics font, choose the Set Attributes command, and specify Bold Face and a point size of 54. To enter the masthead, pick Text from the Draw menu, move the pointer to the center of the page, click the mouse, and type The Printed Circuit. Don't worry if the masthead spills onto the second page.

The Block Select command from the Edit menu is the general-purpose pasteup tool. Triggering this command replaces the pointer with a pointing hand. Holding down the left mouse button and dragging the hand creates a dotted *bounding box* that can be wrapped around an image. Once encased, an image can be rotated, flipped, and moved around the page. To turn the masthead on its ear, place the bounding box entirely around the text and release the mouse button. The selected text is surrounded by little black boxes called *handles*. Press <F8> (Rotate) three times and the masthead turns counterclockwise in 90-degree increments until it is resting on its side. Because the masthead remains the current selection, position the pointer anywhere on the text and drag it down the page so the *t* in *Circuit* is even with the 8½-inch mark on the vertical ruler (see Screen 1). Be careful to place the pointer on a letter—yanking a handle will stretch the masthead.

To produce and position the subheading "A Weekly News Service for Mythical Employees," select a smaller point size (in this example, 10 point) and follow the steps outlined previously. Because 10 point is rather lilliputian in the Current Page view, you may prefer to enter the text in the Actual Size view, then step back to Current Page. To visually separate the masthead and subhead from the rest of the newsletter, draw two vertical lines (known as *rules* to typographers) about ⅛ inch apart using the Horz/Vert Line command from the Draw menu. Complete the masthead by entering the date, the volume and issue numbers, and the company name in



Screen 1: In Windows Draw, you can turn the masthead on its ear by pressing <F8> (Rotate) three times.

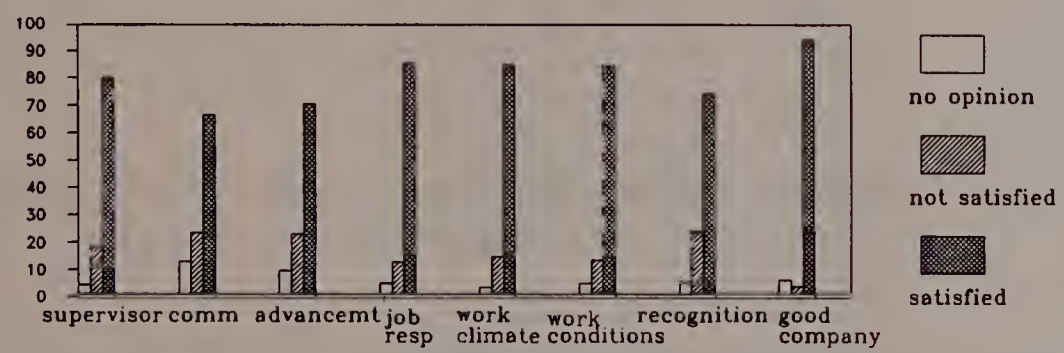
MESSAGE TO EMPLOYEES

Employee Review Results are Positive

Dear Fellow Mythical Employees:

Your responses to the Employee Review, summarized in this issue of The Printed Circuit, show your willingness to speak out about issues that concern you, and your interest in contributing to the success and growth of our Mythical Corporation.

More than 1,200 of you in the greater Xanadu area took the time to complete the questionnaire. You gave us worthwhile information that will help us improve our Mythical technology and productivity.



You told us that you like your jobs and you like working for Mythical. Most of you feel your contributions are recognized, but a few of you would like more Mythical feedback. You see quality as the issue most important to our continued success, not only in our Mythical products and services, but in every aspect of the jobs we do.

We have already taken steps to respond to some of your concerns and suggestions. In a recent letter to employees, Charles B. Unicorn, our Mythical president, pointed out his plan for maintaining Mythical's quality. Other Mythical activities and projects will address the remainder of your concerns.

Speaking for the senior management team, I want to thank each of you for your contributions to this year's review. Please continue to give us your ideas. They are vital to our continuing Mythical success.

Celestial Smith
Vice President/
Personnel and
Employee Relations

Celestial Smith

The Printed Circuit

A Weekly News Service for Mythical Employees

July 4, 1986
Volume 555
Issue 17632

Mythical Corporation

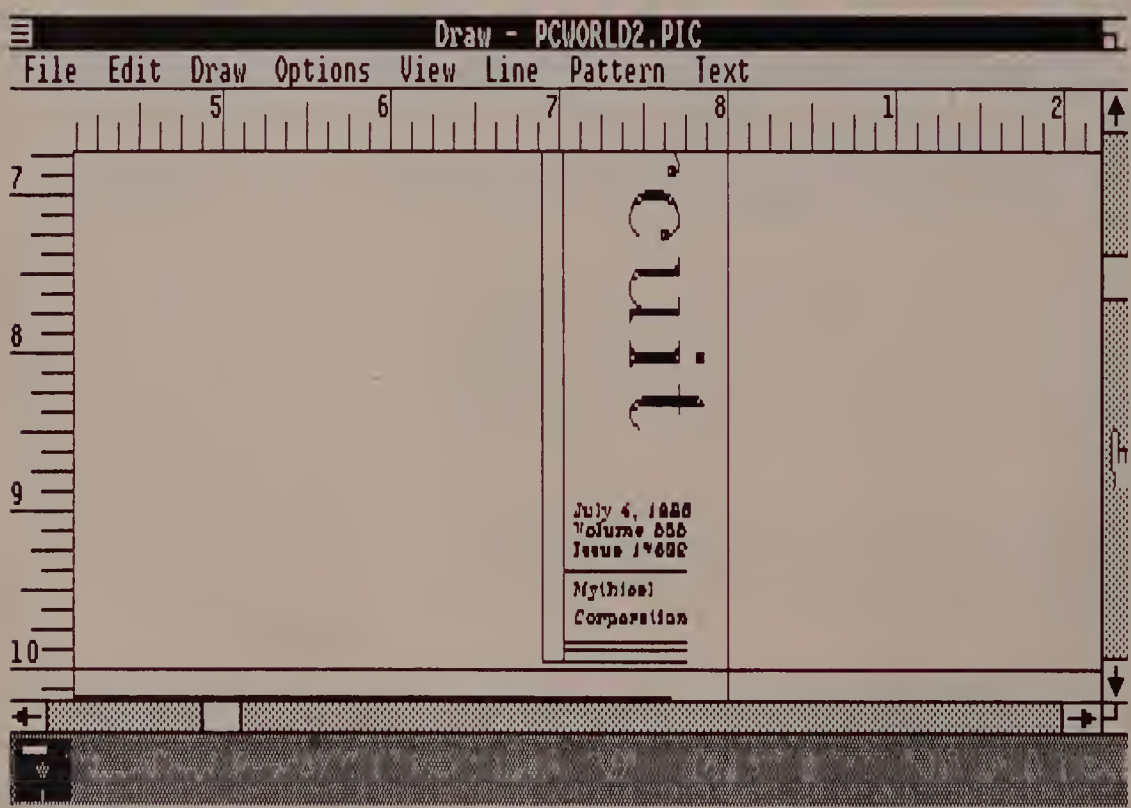
Figure 1: Microsoft Windows does page makeup—and it's easier than you think. Text was entered in Windows Write, a chart was created by 1-2-3, and all the elements were assembled in Windows Draw.

the 6-point Courier standard font, and set the masthead off with horizonal lines (see Screen 2). Save the page in a file called CIRCUIT and close *Draw*.

Write the First Time

Importing text created with a stand-alone word processor into *Write* isn't necessarily difficult, but the fancy formatting you may have slaved over will be ignored. The amount of data that *Write* can swallow in one gulp also varies. *Write* can open *Microsoft Word* documents directly and capture whole files from word processors designed to run in a Microsoft window. (At press time, only *pfs:write* could make that claim.) To import from other word processors you must rely on the *Windows* Clipboard, which can transfer only one screenful of data (about 2000 characters) from such applications at a time. Whatever word processor you use, edit and proofread a document carefully before moving it to *Draw*. As with most graphics programs, *Draw*'s text editing functions are primitive at best.

Draw is no *PageMaker*—you can't pour text into previously defined columns. Thus you should set the desired column width in *Write* before entering text in *Draw*. For the first page of *The Printed Circuit*, enter text single-spaced with a ragged right margin. For the two-column format on page 2, single-space the text and set the right margin at the 4-inch mark. *Write* cannot display two columns of text side by side, so you must enter all the items for page 2 in a single column and copy text an article or a column at a time into *Draw*.



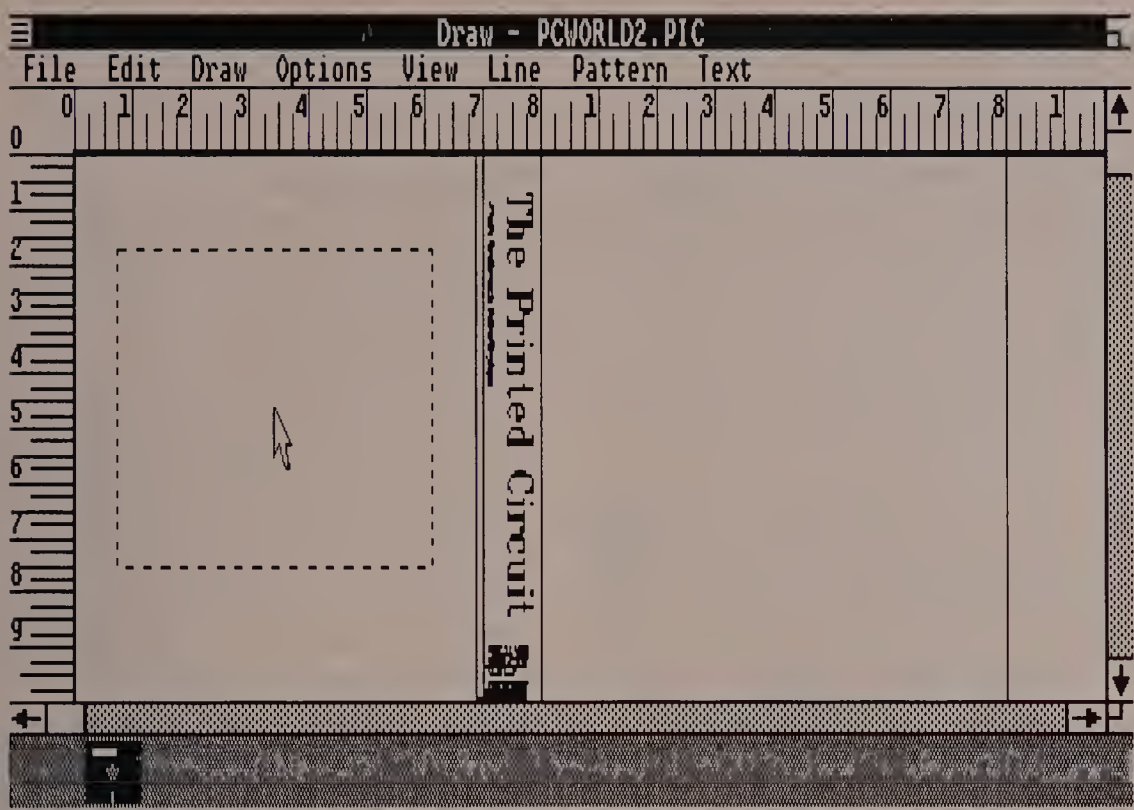
Screen 2: Adding publication information is a matter of shifting to the Actual Size view, selecting the 6-point Courier font, entering text, and adding horizontal rules.

All the News That Fits

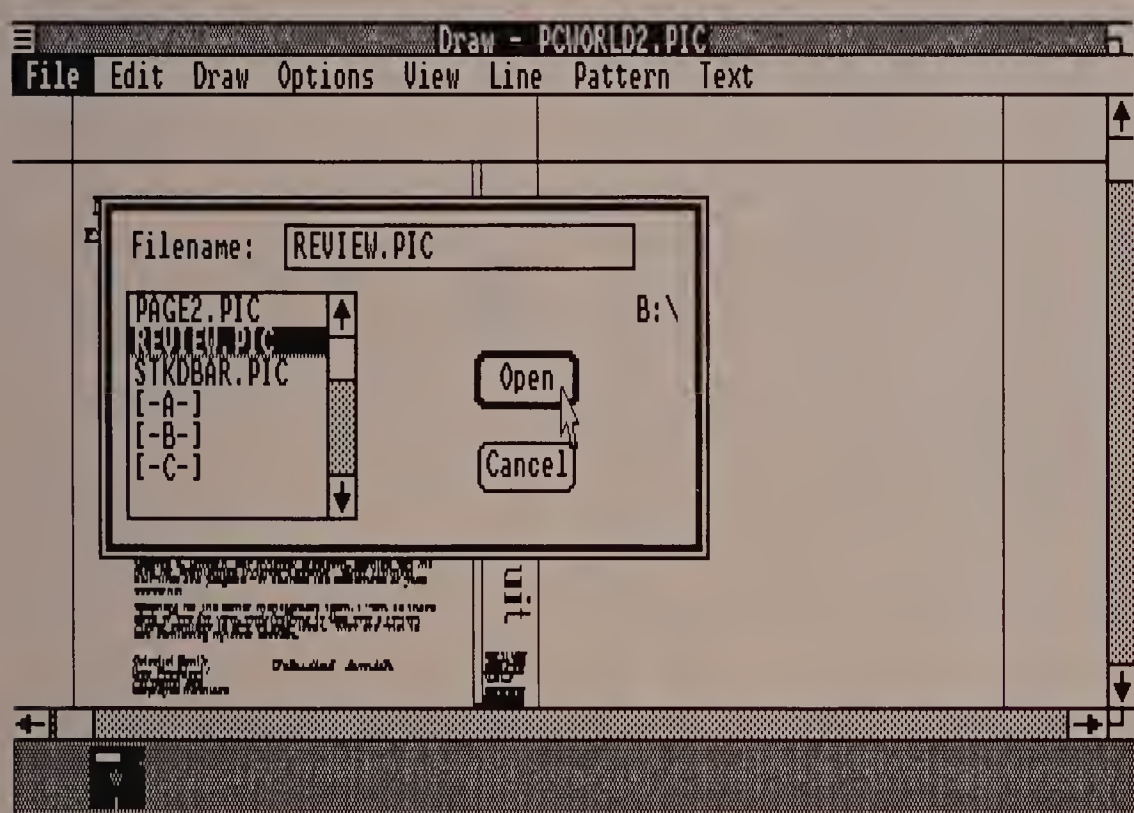
Within the *Windows* environment, the Clipboard can tote as much as 64K of data. Consequently, moving text from *Write* to *Draw* is quick and simple. To copy the lead article ("Message to Employees") to the Clipboard, highlight the item in the *Write* document by holding down the mouse button as you drag the pointer down the column of text. Choosing Copy from the Edit menu automatically copies the text to the Clipboard. Exit *Write*, load *Draw*, open the CIRCUIT.PIC file holding the masthead, and select the 12-point Roman graphics font. When the text is finally dropped into *Draw*, it will take on those attributes.

Choosing Paste from the Edit menu transforms the pointer into an outlined cross. Press the mouse button, and a bounding box equal to the size of the clipped text is displayed. To paste the text into place, position the box on the page and release the button (see Screen 3). If you're comfortable with multiple windows and you have an AT or a comparable machine, you can perform this fetch-and-carry operation with *Write* and *Draw* displayed side by side. That tactic makes it easier to gauge how much text will fit within a given space in *Draw* and spares you from constantly opening and closing these applications.

For extra impact, enlarge the "Message to Employees" headline. Enclose it in a bounding box, then choose the Roman graphics font with 36-point and bold attributes. If this expanded headline juts into the masthead to the right, you can



Screen 3: Cut-and-paste operations in Draw can be performed by positioning a bounding box (equal to the size of the clipped text) on the page.



Screen 4: To import a 1-2-3 .PIC file, simply select the Merge Lotus Graph command from the File menu, pick the appropriate graph, then click to Open.

reverse the action with *Draw*'s Undo command and repeat the procedure using a smaller point size, or merely grab a handle and shrink the headline. In this sample newsletter, the "Employee Review Results are Positive" subheading was also enlarged to 24 points. *Draw* does not automatically center text as a dedicated page composition program does, so you may have to perform this chore whenever you change the type size.

Text Meets Graphics

No newsletter (or business report, for that matter) can be taken seriously unless it has the obligatory bar or pie chart. Micrografx, aware of this unwritten law, equips *Draw* to directly import *1-2-3* and *Symphony* .PIC files. Once captured and converted, a graph can be manipulated like any other *Draw* object.

To make room for the graph on the first page of *The Printed Circuit,* select the last three paragraphs and closing of the article and move them to the bottom of the page. Choose the Merge Lotus Graph command from the File menu, pick the graph (in this case, a *1-2-3* graph called REVIEW.PIC) from the dialog box, and click on Open (see Screen 4). *Draw* always places immigrants on the leftmost displayed page. If the figure sprawls across existing images, no damage is done. The graph has already been selected and bracketed by handles, so merely drag it to the newsletter's blank second page and work on it there.

Before sizing the graph, you can add patterns to the bars, label the *x*-axis, and create a legend. Because Block Select is still active, filling a bar with a pattern is a matter of clicking on the bar, choosing a design from the Pattern menu, and releasing the mouse button. However, if a graph is originally saved with the *1-2-3* or *Symphony* default crosshatch pattern, the process grinds to a halt, since *Draw* treats every stripe in a bar as a separate object. When you first save a *1-2-3* graph, use the /Graph Options Color command to fill the bars with a solid color; with *Symphony,* set Hue to a color rather than a pattern. Once in *Draw,* the bars can be filled with any *Draw* pattern posthaste.

To label the *x*-axis, specify a font and a point size (the 8-point Roman graphics font was used in this example), choose Text from the Draw menu, and enter the label under each bar. To create a legend for the graph, select Rectangle from the Draw menu and generate a small box to the right of the graph. You can make exact duplicates by placing the pointer on the box, simultaneously pressing the mouse button and <Shift>, and pulling the pointer down. Fill the boxes with patterns matching the bars, and label them "no opinion," "not satisfied," and "satisfied" with the same font.

In order to size the graph and its new accoutrements, you must first turn the collection into a single *Draw* object. Surround the group with a bounding box, and select the Combine command from the Options menu. Remember that everything within the bounding box must be a graphic—standard text cannot be combined or scaled. Size the image by pulling and pushing the appropriate selection handles until the graph matches the space set aside on the first page of the newsletter. For that final, personalized touch, "sign" the newsletter with *Draw*'s Script font.

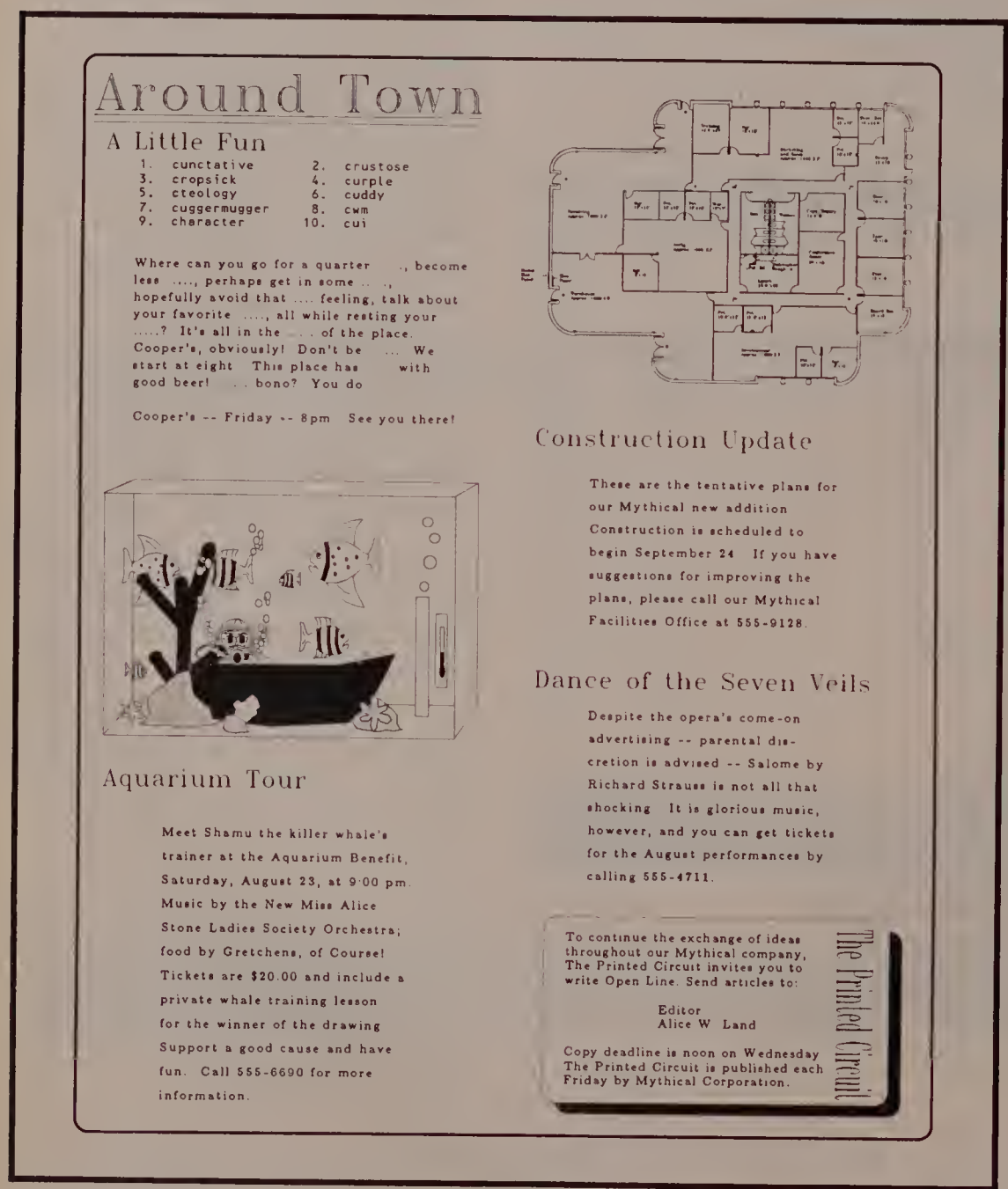


Figure 2: Page 2 of The Printed Circuit mixes graphics text and hand-drawn images, and saves printer memory by relying on standard text fonts for the bulk of the page.

The Flip Side

Building the second page of *The Printed Circuit* is mostly a matter of applying the skills you've learned so far (see Figure 2). The headlines are composed with graphics fonts, but the remaining text on the page is set in *Draw*'s standard fonts and the LaserJet's 92286B font cartridge. Set the headlines in the 16-point bold Roman graphics font and the article text in 10-point Tms Rmn standard font. You can form the page border with a thick rounded rectangle. To create the shadow box in the lower right corner, enclose the text in a rounded rectangle, drag a duplicate of the rectangle down and to the right, and fill it with black. Selecting *Draw*'s Move to Bottom command slips this "shadow" beneath the first rectangle.

The floor plan and the aquarium illustrations are sample .PIC files included on the *Draw* disk. To incorporate illustrations in the newsletter, use the Add Window command from the System menu. This vertically bisects the screen and loads another copy of *Draw* in the right window. Open the .PIC file in this new window, mark it with Block Select, size the image, and copy it to the Clipboard. Move the pointer to the first *Draw* window and paste the picture into the newsletter.

Newsletter by Laser

Putting your finished work on paper entails selecting the Print All Pages command from the File menu and waiting. On an XT using *Draw*'s 300-dpi LaserJet driver, it took 35 minutes to print the first page of the newsletter; on an AT, under 20 minutes. Performance can be improved and memory conserved by installing Micrografx's alternative driver, which prints text at 300 dpi and graphics at 150 dpi. To avoid the angst that sometimes pervades a LaserJet session, carefully examine documents on screen before sending them to the printer, and make sure the correct font cartridge is inserted in the LaserJet. If you have a dot matrix printer, you can also save time by quickly printing out a draft and making corrections before tangling with the LaserJet.

Avoiding HP's dreaded 'out of memory' error message is largely a matter of trial and error. To stay within the LaserJet Plus's memory constraints, you should generally use standard text fonts (which require little memory) for the body of a document and reserve graphics fonts for headlines, mastheads, titles, and decorative purposes. Because of the way *Draw* treats graphics, Micrografx also advises users not to go overboard with vertical and horizontal lines; according to the company, a full-page grid can easily bring the LaserJet Plus to its knees.

Open Windows

Windows, like the IBM PC, is an open system, and the future holds other, more capable page makeup programs (see "Taking a Page From the Pros," *PCW,* July 1986). Nonetheless, *Windows, Draw,* and *Write* in combination are a simple and inexpensive means of producing many documents that fall into the domain of personal computer publishing. Of course, slowness in printing, the lack of large, bold headlines, and *Draw*'s inability to maintain right justification of imported text are significant limitations. HP is reportedly developing drivers that address the first two problems, speeding up output and allowing programs to access LaserJet soft fonts. For true page composition, you may want to wait for *PageMaker* for the PC. But in the meantime, this is a low-cost solution that gets the job done.

Nancy Andrews, author of Windows: The Official Guide to Microsoft's Operating Environment *(Microsoft Press, Redmond, Washington, 1986), is a freelance writer living in Seattle.*

LaserJet Plus
Hewlett-Packard
800/367-4772
List price: $3995

Microsoft Windows version 1.01, Windows Write version 1.00
Microsoft Corp.
16011 N.E. 36th St.
Box 97107
Redmond, WA 98073-9717
206/882-8080
List price: $99
Requirements: 256K (512K recommended); two disk drives (hard disk recommended); DOS 2.00 or later version; IBM Color/Graphics Adapter, IBM Enhanced Graphics Adapter, Hercules Graphics Card, or compatible graphics board; appropriate monitor
Not copy protected

Windows Draw version 1.00
Micrografx, Inc.
1820 N. Greenville Ave.
Richardson, TX 75081
800/272-3729, 214/234-1769
List price: $199
Requirements: 320K (512K recommended); two disk drives (hard disk recommended); DOS 2.00 or later version; Microsoft Windows; IBM Color/Graphics Adapter, IBM Enhanced Graphics Adapter, Hercules Graphics Card, or compatible graphics board; appropriate monitor
Not copy protected

Stylish Word Templates

Here's how you can use templates and style sheets to standardize and automate your forms and documents.

Matthew Holtz

Like all word processing systems worth their salt, *Microsoft Word* lets you incorporate fairly elaborate formats into your documents. You can vary typefaces and sizes, adjust margins and tab placement, and justify text right and left. While formatting doesn't alter the content of the document, it certainly affects how the reader perceives the content; formatting is thus a powerful word processing tool.

Microsoft Word offers more formatting power than most word processors. Any package will let you modify a document's format; however, most allow you to do so only by embedding commands into the document as you create or edit it.

With *Word*'s style sheets, you can format indirectly. A style sheet is a separate file of format commands that you apply to existing documents or to those you'll generate later. Rather than formating a document directly, you create a file of specifications that *Word* can cross-reference to a document. Multiple documents can reference the same style sheet. The advantage to a style sheet is the speed with which you can generate a multitude of documents that have a consistent, professional appearance.

Fred Simson

Looks aren't everything, however. Style sheets cannot store text, so they won't spare you from retyping boilerplate passages. Consider the basic invoice, for example. Text such as "Total" or "Thank you for your patronage" is repeated from one invoice to the next. If you use only a style sheet, you must essentially re-create each invoice or purchase order every time you issue one. You can solve this problem by generating a template for each form, an approach that may be worthwhile even with long text-oriented documents. For example, financial reports often contain much text that is repeated from quarter to quarter.

Although a large section of the *Word* manual discusses style sheets, the book never mentions the word *template*. The capability exists, nonetheless. In this article you'll learn to tailor your own templates and use them in conjunction with style sheets to print out professional-looking invoices, reports, and newsletters.

The Right Kind of Format

Because style sheets and templates are not appropriate for every kind of document, you need to decide whether they suit your applications. For example, *Word*'s Print Merge feature can be used for merging addresses into letters for mass mailings. For entering larger bodies of text that recur throughout your documents (such as contract clauses or lists), you can use *Word*'s macro feature, the Glossary. Glossary entries have no innate ties to specific style sheets or templates. When you want to insert them in a document, you invoke them with a code word. The Glossary also supplies basic format features that you can invoke at will, such as page numbering, which you activate by typing *page* and pressing the Glossary key, *F3*. *Word* provides similar Glossary notations for numbering footnotes and, in release 3.0, for including the current date and time in the text.

The decision tree in Figure 1 can help you decide which *Word* feature to use, but you should also make a list of the kinds of documents you generate and then organize the list into groups of documents with similar formats. You can probably assign each group to one style sheet and create templates for each document in a group.

Consider these additional elements as you make your list: Which documents are likely to be seen or used together? Which documents come from the same department, or should appear to? Which share layout characteristics, such as tab settings, paper size, and margin width?

After you've grouped your documents, decide which should have templates. If you repeatedly generate the same document, then create a template. Unique documents—generated periodically but composed of new information—require only a style sheet.

Suppose that your list of documents includes invoices, billing statements, purchase orders, credit memos, quarterly reports, grant proposals, financial statements, newsletters, and catalogs. Group the first four categories and assign them to a style sheet called Accounts. Although the text is different in each one, spacing, typefaces, and tab settings are the same. Next, since both quarterly reports and grant proposals use financial statements, the three documents should look similar. Group them and assign them to a style sheet called Formal. Finally, the newsletters and the catalogs have similar multicolumn layouts and are often mailed out together. So they'll reference the Publish style sheet.

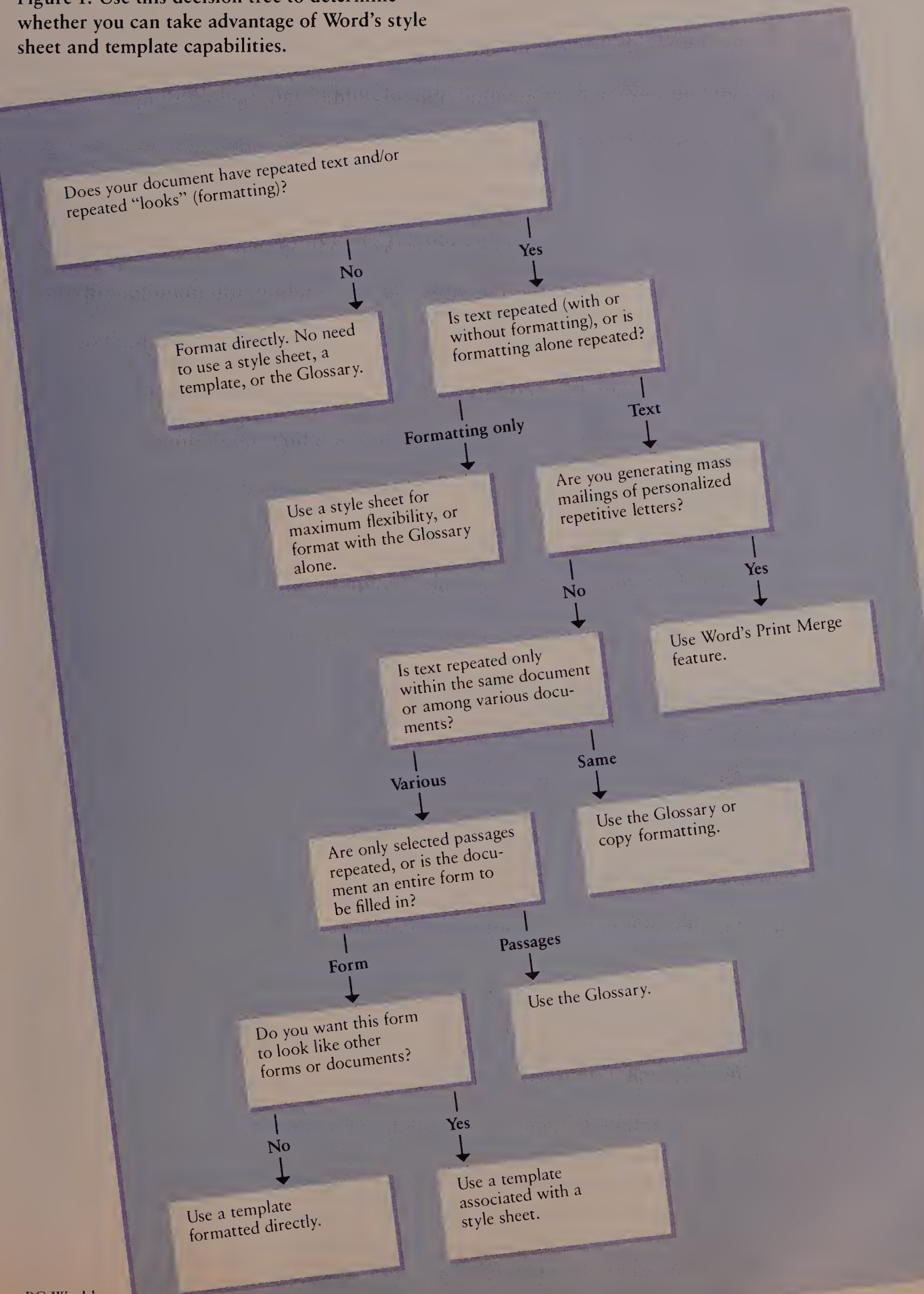
A Review of Style

A style sheet is actually a collection of format instructions, each of which is referred to as a *style*. Each style is defined by a *usage* and a *variant* and can be assigned a *key code* and a *remark*. The key code is a two-letter tag, such as TE for "text entry" or DP for "division paragraph," which serves as a quick reference.

Usage indicates the nature of the style entry. *Word* provides three choices: Character, which controls the size and style of text characters; Paragraph, which lets you define the indention, line spacing, and tabulation of paragraphs or bodies of text; and Division, which controls the overall design of the page itself, including margins, page headings, footnote placement, and the design and placement of multiple columns. Finally, the variant indicates which variation of a usage the style is. *Word* allows 26 Character styles, 21 Division styles, and 71 Paragraph styles.

To create a style sheet, select the Gallery command from the main menu and specify Insert. When the Insert dialogue box appears, enter a key code, a usage, a variant, and a short descriptive remark at the appropriate prompts. Press <Enter> and choose Format. *Word* opens a style sheet window displaying a list of the default

Figure 1: Use this decision tree to determine whether you can take advantage of Word's style sheet and template capabilities.



settings for the particular usage you selected. You can then edit the style by entering information in the fields of the appropriate Format menu (Character, Paragraph, or Division). After you've edited all the entries, save the entire style sheet using the Transfer Save command from the Gallery menu. (For a full discussion of style sheets, see "Dress Up Your Documents," *PCW*, September 1985.)

Accounting for Style

Look closely at the Accounts style sheet, starting with the Division style at the top in Figure 2. Page layout calls for a page length of 5½ inches. Note that the margins have been narrowed to ½ inch all around to make good use of the smaller size.

All four templates that reference the Accounts style sheet will contain four sections (see Screen 1): the title, the top section (for the billing address and the return address), the terms section (for the billing specifics), and the line item section (for the billing totals). These sections are treated like distinct paragraphs. The title is flush right and underlined and has a large typeface. The format for the terms section has tabs every 1½ inches, and the section for line items is double-spaced (indicated by the entry 10/24) and has four tab settings. The first column is flush right, the second is flush left, and the last two are decimal aligned.

Constructing a Template

To create the Invoice template, use the Exit command to return to the main menu and use the Format Style Sheet command. Specify Accounts as the style sheet that the Invoice file should reference. You can walk through the setup process by referring to the Accounts style sheet in Figure 2 and the Invoice template in Screen 1. The printed result is shown in Figure 3. With the cursor at the top of the window, set up the Title style by typing <Alt>-TI and then the title itself, Invoice. *Word* will automatically position the text and assign it the appropriate case and size.

The next entry, the return address, is not part of the style sheet or template text but is read into the file separately from the Glossary. You could type it into the template, but because it might appear on all documents, not just those associated with the template, most users would want to store it separately as a macro.

When entering template text, press the key code for character styles, in this case either TT or CH, before you type the word. Use TT for all text except the title and the column headings (date, number, salesperson). While the title style will automatically induce the typeface outlined in the style entry, TT will enter the text into the template in 10-point roman small capitals, and CH will enter the text in 10-point underlined small capitals. Invoking these styles designates the character format established in the style sheet. After typing each word of template text, hold down the <Alt> key and press <Space> twice to turn off the <Alt>-TT or <Alt>-CH command. That way, when the invoice is filled in, input will appear in standard typeface.

Press <Shift>-<Enter> to end lines of text. *Word* uses the <Enter> key to mark the end of each style section, so only press <Enter> when you are finished entering all the text that falls into

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TI »                                                    Invoic

    WISHTICK
    Fantasy Fulfillment Foundation
    1234 Yellow Brick Road
    Ozland, CA  94000


TO       TO:
    ADDRESS:
       CITY:

TE  date          number        salesperson    your #        terms


LI  hours     service                              rate    amount

              TOTAL (THANK YOU!):
PS  ◘
COMMAND: Alpha Copy Delete Format Gallery Help Insert Jump Library
         Options Print Quit Replace Search Transfer Undo Window
Edit document or press Esc to use menu
Page 1   {}                                CL Microsoft Word: INVOICE.TEM
```

Screen 1: The Invoice template conforms to the styles outlined in the Accounts style sheet. The address was copied into the top section from the Glossary. You can display the key codes in the left margin by setting the main menu's Option command to Partial.

```
1  DS Division Standard                          STANDARD PAGE LAYOUT
       Page break. Page length 5.5"; width 8.5". Folios Arabic. Top margin
       0.5"; bottom 0.5"; left 0.5"; right 0.5". Top running head at 0.5".
       Bottom running head at 0.5". Footnotes on same page.
2  PS Paragraph Standard                         STANDARD PARAGRAPH
       TMSRMN (roman a) 10/12. Flush left.
3  TI Paragraph 1                                TITLE
       HELV (modern i) 14/12 Underlined. Flush right, space after 1 li.
4  TO Paragraph 2                                TOP SECTION
       TMSRMN (roman a) 10/12. Flush left, space before 1 li. Tabs at:
       0.8" (left flush).
5  TE Paragraph 3                                TERMS SECTION
       TMSRMN (roman a) 10/12. Flush left, space before 1 li. Tabs at:
       1.5" (left flush), 3" (left flush), 4.5" (left flush), 6" (left
       flush).
6  LI Paragraph 4                                LINE ITEMS
       TMSRMN (roman a) 10/24. Flush left, space before 1 li. Tabs at:
       0.5" (right flush), 1" (left flush), 5" (dec. aligned), 6" (dec.
       aligned).
7  CH Character 1                                COLUMN HEADINGS
       TMSRMN (roman a) 10 Underlined Small caps.
8  TT Character 2                                GENERAL TEMPLATE TEXT
       TMSRMN (roman a) 10 Small caps.
```

Figure 2: As you enter styles into the style sheet, Word automatically assigns default settings to each parameter. Edit your Accounts style to match this printout using the Gallery Format command.

WISHTICK **INVOICE**

Fantasy Fulfillment Foundation
1234 Yellow Brick Road
Ozland, CA 94000

TO: Murphy's Advertising Associates
ADDRESS: 5678 Easy Street
CITY: Persuasion, CA 90000

DATE	NUMBER	SALESPERSON	YOUR #	TERMS
10-31-86	1340	Zardust	N/A	Net 30

HOURS	SERVICE	RATE	AMOUNT
8	Needs consulting	30.00	240.00
16	Paraphernalia training	25.50	408.00
24	Spell operations	38.00	912.00
	TOTAL (THANK YOU!):		1560.00

Figure 3: A finished invoice generated on a laser printer. The invoice was created with the Accounts style sheet shown in Figure 2 and the Invoice template seen in Screen 1.

```
1  DS Division Standard                          FORMAL LAYOUT
       Page break. Page length 11"; width 8.5". Folios Arabic. Top margin
       1"; bottom 1"; left 2"; right 1.25". Top running head at 0.5".
       Bottom running head at 0.5". Footnotes on same page.
2  PS Paragraph Standard                         STANDARD PARAGRAPH
       TMSRMN (roman a) 10/12. Justified. Tabs at: 4" (dec. aligned), 5"
       (dec. aligned).
3  TI Paragraph 1                                TITLE
       HELV (modern i) 14/12 Uppercase. Centered, space before 16 li. Tabs
       at: 4" (dec. aligned), 5" (dec. aligned).
4  SE Paragraph 2                                SECTION HEADING
       HELV (modern i) 14/12 Uppercase. Flush left. Tabs at: 4" (dec.
       aligned), 5" (dec. aligned).
5  SU Paragraph 3                                SUBSECTION HEADING
       HELV (modern i) 14/12. Flush left.
6  PH Character 1                                PARAGRAPH HEADING
       Courier (modern a) 12.
7  FL Character 2                                FIRST LETTER IN THE SECTION
       HELV (modern i) 12 Bold Uppercase.
8  FR Character Footnote reference               FOOTNOTE REFERENCE
       TMSRMN (roman a) 8.
9  FT Paragraph Footnote                         FOOTNOTE TEXT
       TMSRMN (roman a) 8/12. Justified.
```

Figure 4: Use the Formal style sheet to generate the Quarterly Report, Grant Proposal, and Financial Statement templates. Because all these reports will be bound, the Division Standard style will set the left margin at 2 inches.

```
1  DS Division Standard                          PUBLISH STANDARD LAYOUT
       Page break. Page length 11"; width 8.5". Folios Arabic. Top margin
       1"; bottom 1"; left 0.5"; right 0.5". Top running head at 0.5".
       Bottom running head at 0.5". Footnotes on same page.
2  D2 Division 1                                 2 COLUMN LAYOUT
       Page break. Page length 11"; width 8.5". Folios Arabic. Top margin
       1"; bottom 1"; left 0.5"; right 0.5". Top running head at 0.5".
       Bottom running head at 0.5". 2 columns; spacing 0.5". Footnotes on
       same page.
3  D3 Division 2                                 3 COLUMN LAYOUT
       Page break. Page length 11"; width 8.5". Folios Arabic. Top margin
       1"; bottom 1"; left 0.5"; right 0.5". Top running head at 0.5".
       Bottom running head at 0.5". 3 columns; spacing 0.5". Footnotes on
       same page.
4  PS Paragraph Standard                         STANDARD PARAGRAPH
       Courier (modern a) 12. Flush left.
5  HE Paragraph 1                                HEADLINES
       TMSRMN (roman a) 10/12. Flush left, space before 2 li.
6  BY Paragraph 2                                BYLINE
       TMSRMN (roman a) 8/12 Italic. Flush right, space after 1 li.
7  MA Paragraph 3                                MASTHEAD
       TMSRMN (roman a) 8/12. Justified.
```

Figure 5: The Publish style sheet is the basis for the Newslett and Catalog templates. Since both documents are publications, the style sheet includes entries for three different column widths.

a specific Paragraph style. Continue creating the template by typing <Alt> and the key code for each style, followed by the text. To move the cursor to the next position within each section, use the <Tab> key.

Style in the Formal Sense

Just as you created the Accounts style sheet and the Invoice template, generate the Formal style sheet shown in Figure 4. Notice how the sizes of the paper and the margins differ from those of the first style sheet. Because these reports will be printed on only one side of the paper and bound on the left, the left margin is larger.

The template for the quarterly report uses the Title style element first. The large value in the 'space before' choice will place the title low on the front page. After typing <Alt>-TI and the title, insert a page break by pressing <Ctrl>-<Shift>-<Enter>. The title will then appear alone on the front page.

In the example, section headings remain the same from one quarter to the next. When you fill out the template each quarter, type the current information after the heading and before the next page break to guarantee that each heading begins a new page. If subsection titles are the same each quarter, you can include them in the template as well.

You can take a similar approach with the Grant Proposal template, which might include quite a bit of repeated text, such as the history of the organization. The Financial Statement template could include the various account names. The titles Income Statement and Balance Sheet would be formatted as section headings. Such category titles as Income, Expenses, and Assets would receive subsection heading formats, and so on. Note that the paragraph formats all have similar decimal tabs: two on the far right for current-quarter and year-to-date columns.

Finally, the Publish style sheet in Figure 5 is cross-referenced by two templates, Newslett and Catalog. You can partially automate the composition process for such publications if you create templates that include the masthead, folios, and headlines for recurring columns or sections. The Publish style sheet makes liberal use of multicolumn layouts. Separate Division styles define 1-, 2-, and 3-column formats, allowing you to fit copy and vary page layout.

Style Sheet and Template Care and Feeding

Be sure to print a copy of your style sheets from the Gallery menu for future reference in case you want to revise one. You can note format characteristics that differ from *Word*'s default settings.

Once you've created a template, you can avert unintentional alteration by assigning it a .TEM extension before saving it. *Word* normally assigns the extension .DOC to its documents, but by specifying a different extension, you prevent your template from being displayed in the document listing activated by the Transfer Load command. This decreases the chances that it will be inadvertently loaded and altered.

To display a list of template files, select Transfer Load and type *.TEM, but press a cursor key instead of <Enter>. Move the highlight to the template you want and load it by pressing <Enter>.

When you fill in a template—to invoice a client, for example—save it as a standard document by giving it a new name without an extension (*Word* will automatically assign it a .DOC extension). If you store it under the original template name, the modified version of the template (complete with client name, address, and billing terms) will replace the original "empty-form" template.

Preparation Is Everything

Word's advanced format capabilities work in concert with one another. Take the time to plan and experiment with variations on the template theme. You may find yourself redesigning your master style sheet several times before you're satisfied. The planning process is essential to well-implemented style sheets; design a decision tree of your own and group your documents into style-related families. If you allow yourself time to experiment and make mistakes, you'll eventually see a dramatic improvement in the appearance and organization of your documents.

Matthew Holtz is a San Francisco-based consultant and the author of Mastering MS Word *(Sybex Computer Books, Berkeley, California, 1985).*

Word 3.0
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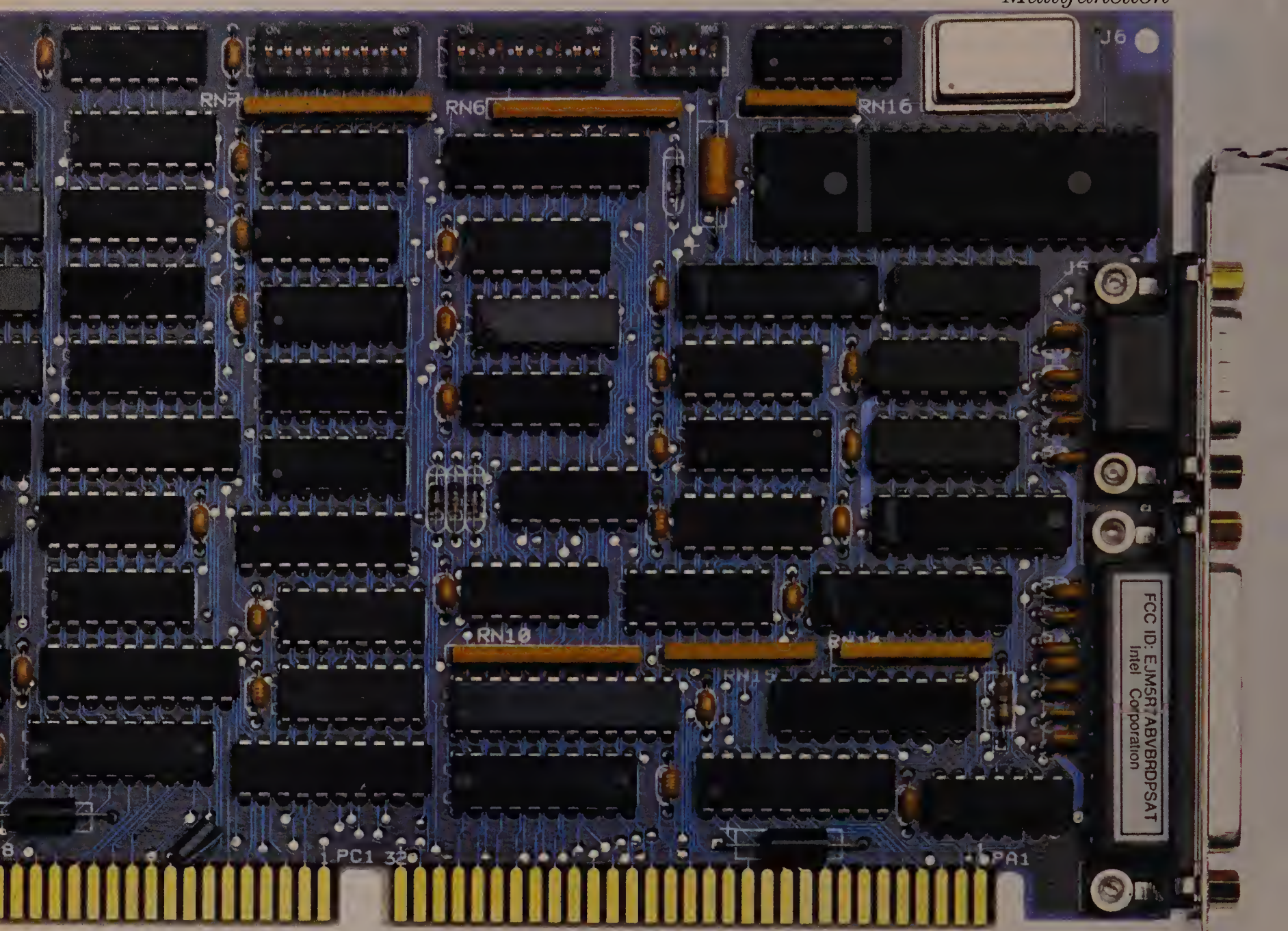

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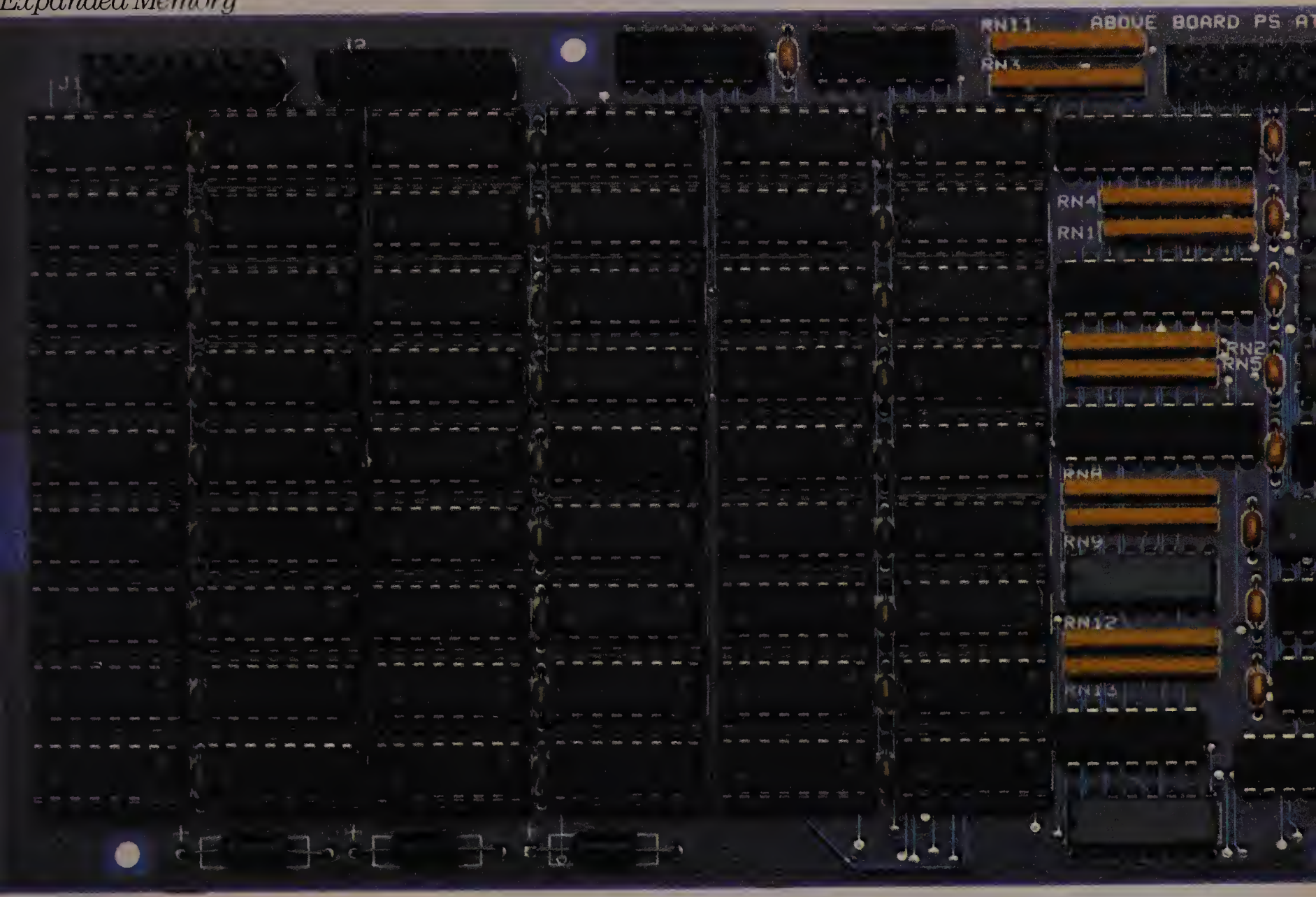

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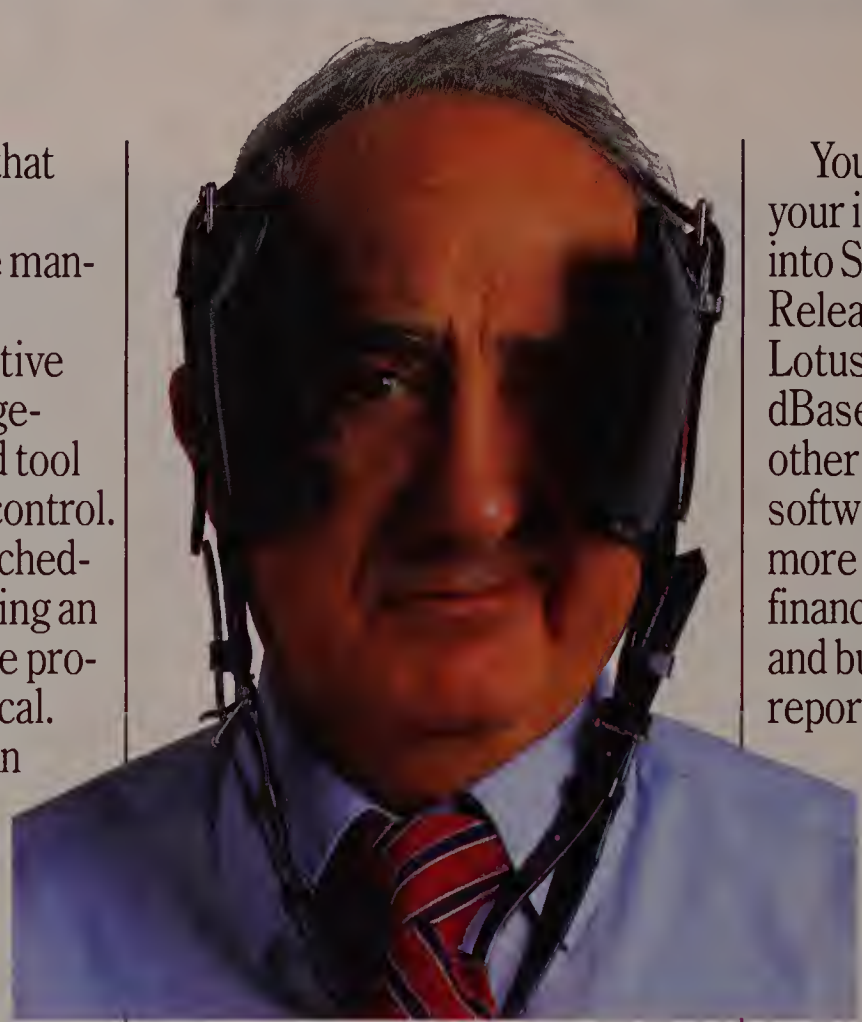

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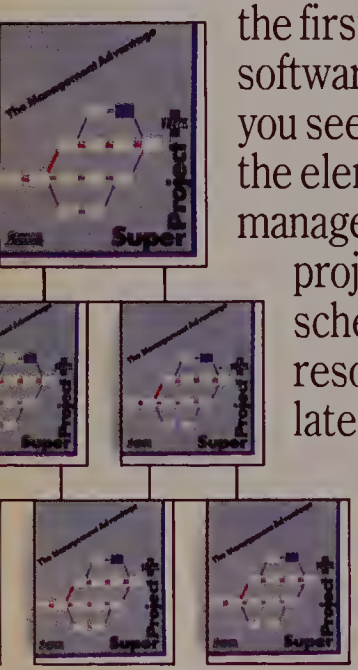

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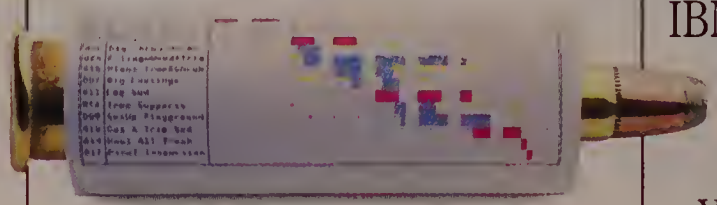

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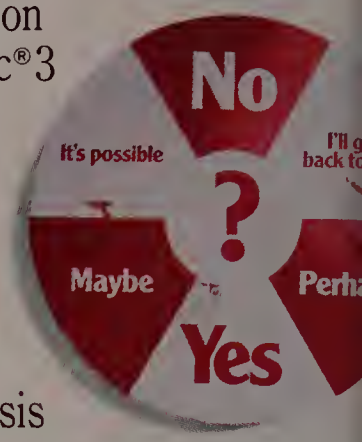

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Password: Communicate

Information and insights on the PC communications marketplace

This month: Dialing in to AT&T-Mail's low-cost electronic mail service, and going on line with Delphi

Edited by Eric Brown

On Line

AT&T-Mail—Let Your E-Mail Do the Talking

AT&T Information Systems announced its low-cost electronic mail service, AT&T-Mail, in late February. You have to wonder about the timing—the E-mail market is already glutted with over 60 electronic couriers, few of which are making a profit.

Yet AT&T appears to have a method to its E-mail madness. Although the electronic mail business is still in its infancy, the amount of E-mail activity has been sufficient to eat into the profits of AT&T's mainstay, long-distance phone access. Ironically, by launching a low-cost E-mail service the company could lose money on its long-distance business. But in the long run, the strategy appears sound. AT&T figures that if electronic mail is going to gobble up its long distance business, it might as well be AT&T's electronic mail.

The initials *AT&T* still wield considerable leverage in the corporate community, and that's exactly where the telecom giant is setting up shop. Although AT&T-Mail lacks access to data bases, the system provides one business-oriented extra not found on other E-mail services: a voice synthesizer that lets you listen to your messages via touch-tone phone.

Whatever AT&T's long-range marketing strategy, the company has initially chosen a conservative, slick system that strives to remain competitive with the top E-mail vendors. During the several weeks I used the service, electronic messages sent to fellow AT&T subscribers as well as AT&T-Mail paper messages sent to nonsubscribers via U.S. mail, 4-hour courier, and overnight courier all arrived as expected, when expected. Telex and TWX delivery is also available. Subscribers have access to the mail system through local numbers in all major metropolitan areas and through "800" numbers from anywhere else in the United States.

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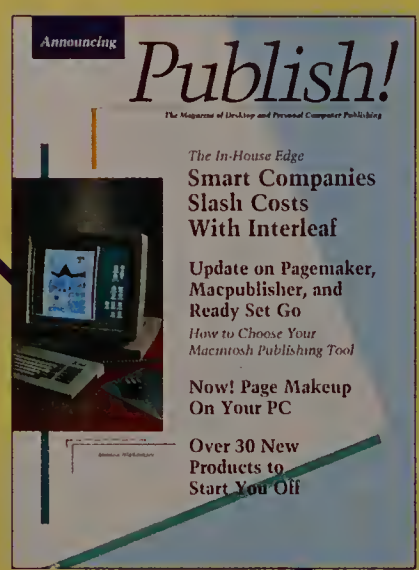

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receive a menu of standard mail commands. Of special interest is the Get command, which retrieves any message you have deleted during your current session. The Show command lists the contents of your electronic desk, a holding area that stores incoming and outgoing mail. For extra cost, you can maintain folders of on-line forms and mailing lists and share mailing lists with other users. AT&T-Mail will even sign your mail for you—you can store your signature to personalize E-mail that is converted to paper.

Although menus guide you through most of AT&T-Mail's operations, uploading and downloading messages from your PC are command-driven. AT&T-Mail handles all its transfers via the XMODEM protocol, so you can send spreadsheets and other program files without risking errors. However, if your software doesn't support this protocol, you won't be able to send messages created off line.

When sending mail, AT&T scans for a subscriber name matching your addressee's; if none is found, the service prompts you for a U.S. postal address. At this point you can also choose to send mail via Telex or courier. To bypass the directory scan, include your Telex or courier option on the initial prompt line.

Although the system is easy to navigate with any communications program, AT&T has produced two top-notch software packages for the PC: *Access I* and *Access II*. *Access I* is extremely easy to use. You merely press one function key; the program then dials the local access number, logs you on, and displays the current contents of your electronic desk. The program includes a text editor but lacks more complex features found in other communications programs. While *Access I* can be used only to log on to AT&T-Mail, *Access II* is a general-purpose communications program designed for advanced users. It supplies all *Access I* features plus

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such options as a dialing directory, a macro program, and VT 100 emulation.

A UNIX version of *Access I* called *PMX (Private Message Exchange)* creates a private message service in-house. Designed for use on AT&T 3B minicomputers, the system resembles a PBX in-house message system. Memos can be shuttled throughout the network or transparently uploaded to AT&T-Mail. *PMX* is part of AT&T's strategy to provide a total E-mail solution for large corporations.

The brightest innovation on AT&T-Mail is its synthesized voice feature, Mail Talk. When you dial from any touch-tone phone to AT&T's text-to-speech service, an electronic voice prompts you to enter your user name and password from the telephone keypad. Your electronic mailbox is then scanned for new messages. By pressing one or two numbers on the phone pad, you can retrieve these electronic messages and have Mail Talk read them to you. The voice synthesizer is clear and easy to understand, although it is obviously mechanical and sounds like a stern grammar school teacher. You can replay messages, speed them up or slow them down, and delete them from the desk, all with the touch-tone keypad. However, you can't send messages via the phone.

AT&T has put together a smooth-running, easy-to-use system. While it's short on innovation, users will find the service reliable and competitive in price. In fact, AT&T-Mail's price structure is nearly identical to MCI's: AT&T E-mail is included in the basic $2-a-month subscription fee, while MCI charges 45 cents per memo. U.S. mail overnight- and urgent-delivery charges are nearly the same on both services, except that overnight delivery is 50 cents cheaper with AT&T-Mail. Forms and signature storage, which are optional, again cost nearly the same with both services. AT&T-

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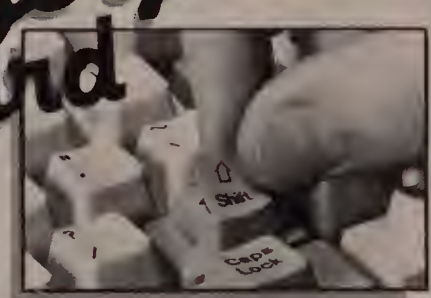

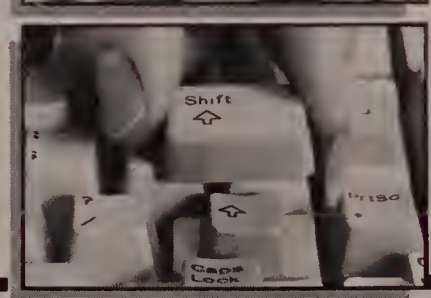

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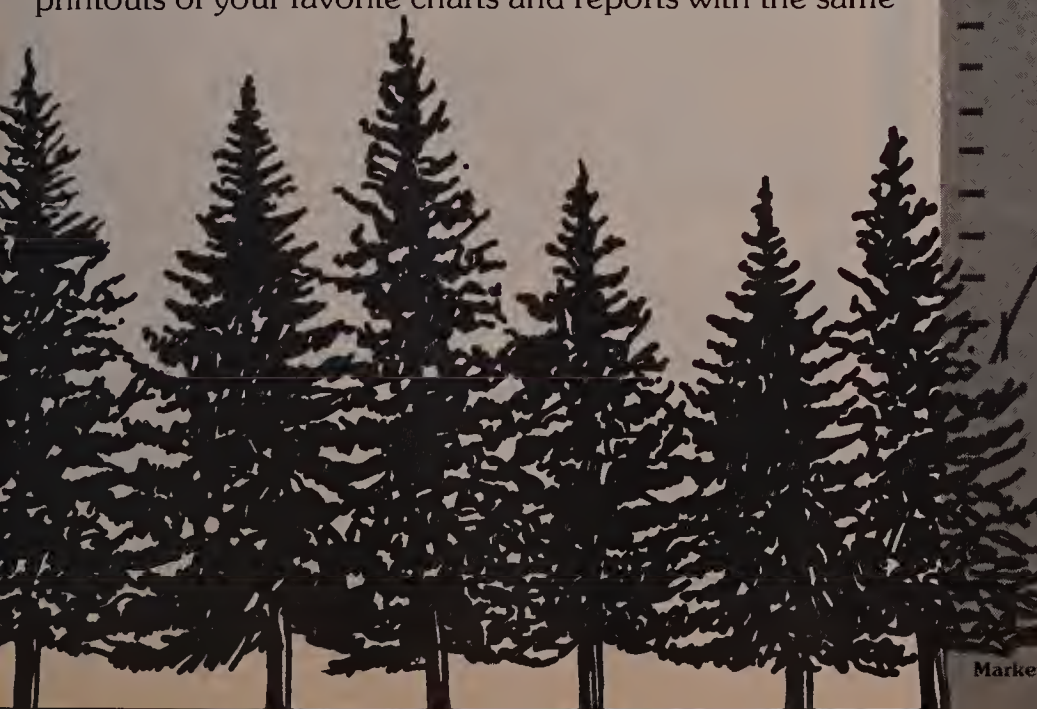

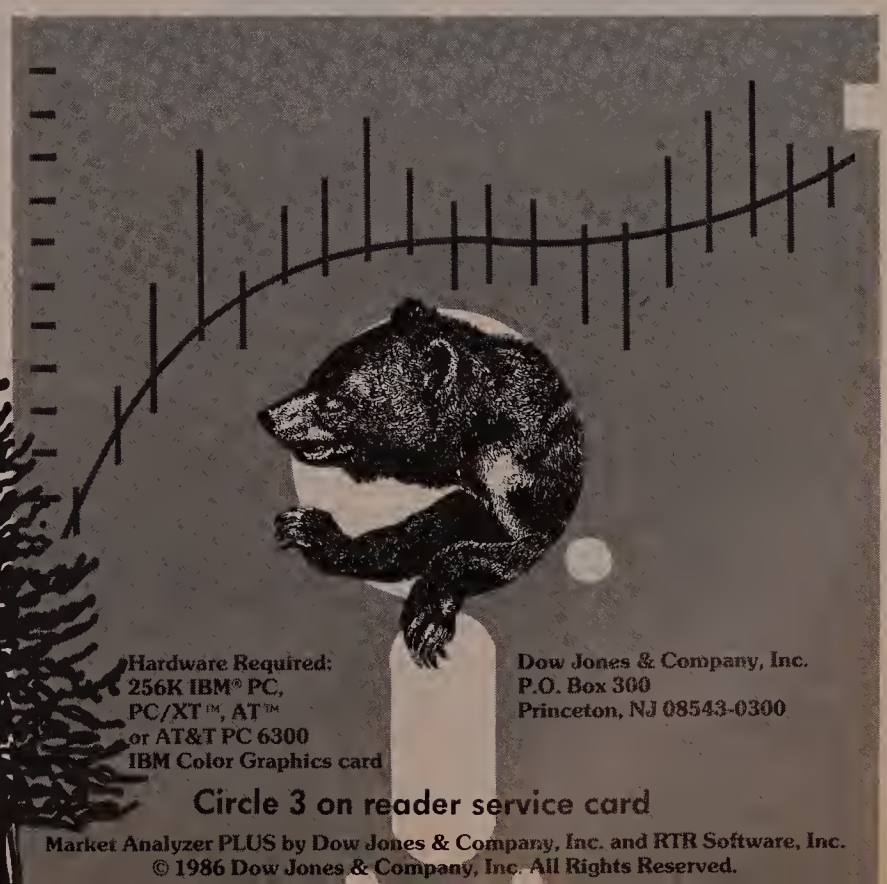

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Delphi: Good Conversation, Bad System Software

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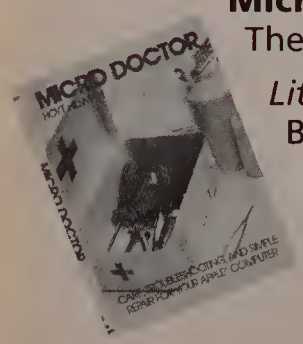

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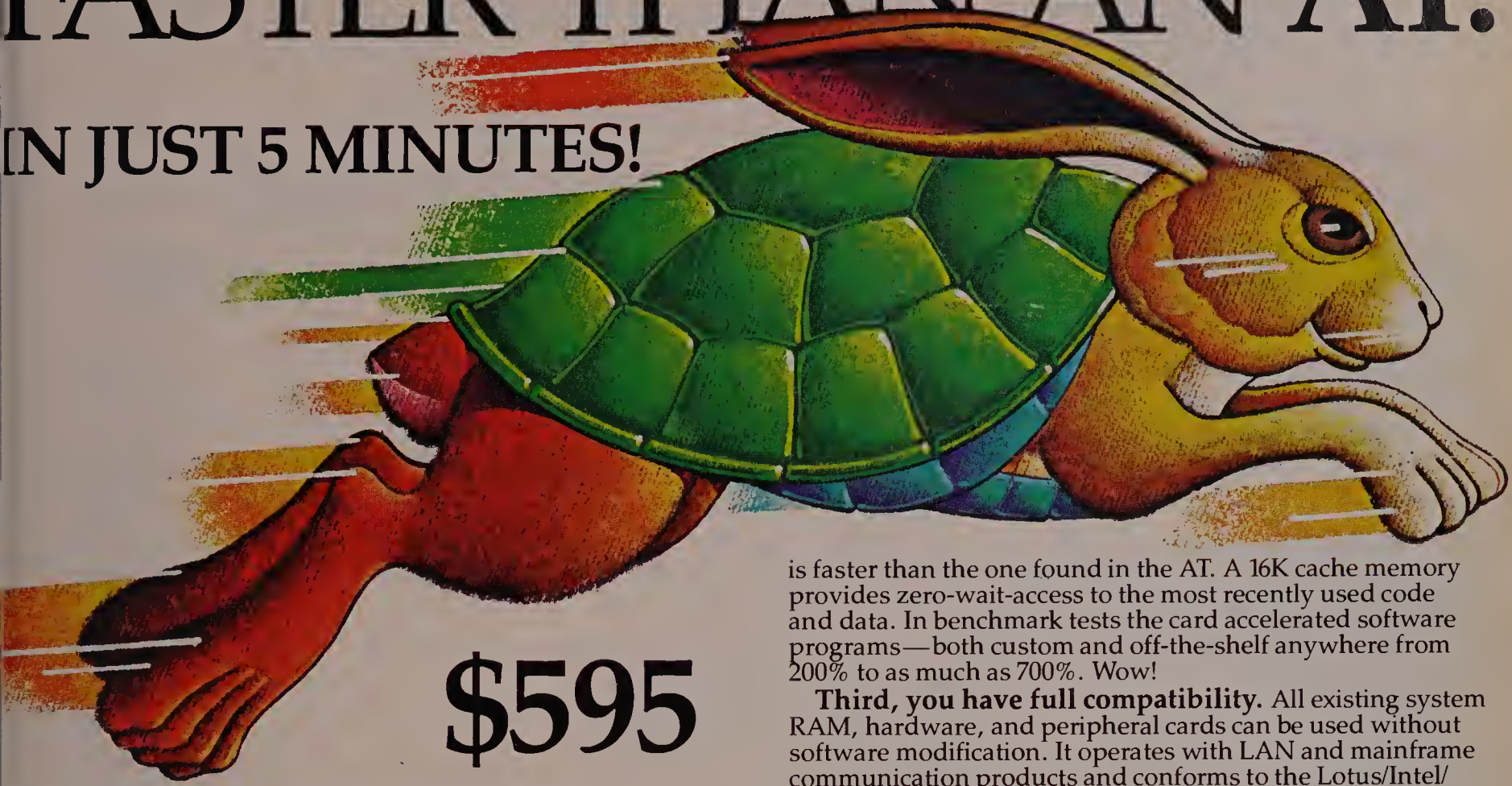

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We wanted to offer a speedup card that would be the compliment to our disk speedup software, (incidentally included at no extra charge.) We wanted it to be literally the most advanced, fastest, most feature rich board available today. We could only be satisfied with a board that was the finest example of the engineering art.

There is no question we have met our every objective by developing and manufacturing the *BREAKTHRU 286* card. This is the best designed and most functional speed up card available today. We guarantee it.

HERE IS WHAT MAKES IT SO SPECIAL.

First, it installs so easily. It is a half slot card, only five inches in length. You don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq and most clones. The instructions are so simple we considered showing a picture of a child putting it in. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, it is advanced. The *BREAKTHRU 286* replaces the CPU of the PC or XT with an 80286 microprocessor that is faster than the one found in the AT. A 16K cache memory provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from 200% to as much as 700%. Wow!

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Fourth, it is the best there is. There are several other boards on the market. Some are priced about the same as the *BREAKTHRU 286* and some are cheaper. We at PCSG have compared them all, but there simply was no comparison. What we discovered is that many cards being sold offer only a marginal speed up in spite of their claims. We found some to be merely versions of the obsolete 8088 or 8086, and others to be just poorly engineered. The 8MHz *BREAKTHRU 286* is unequivocally the best executed and most completely reliable speedup board manufactured today.

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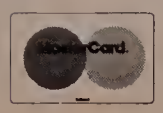

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Characterized in the past as offbeat and highbrow, Delphi has grown up with an image of being a stakeout for savants. It's also acquired a reputation as a service with technical problems. Both assessments are partly true, but the service offers many plums in spite of its snags, and you don't need a Ph.D. to appreciate it.

The first thing you notice about Delphi is that it's a comfortable place to pop into. Like a neighborhood tap, it's friendly, unassuming, often lively. Also notable is its eclectic quality. Included among its major services are electronic mail, real-time CB chatting, and an on-line brokerage. The service provides access to Dialog data bases, Associated Press stories, Accu-Weather weather reports, commodity quotes, and more. Some interesting offerings: access to the Computerized AIDS Information Network, on-line wine reviews, adventure games, and a "personal psychoanalytic advisor" named Uncle Max.

Favored among the attractions, according to Nancy Tully, spokesperson for General Videotex, are the special interest groups (SIGs). Organized like electronic bulletin boards, the SIGs provide real-time conferences, forums for posting public messages, and collections of public domain programs.

Some impressive SIGs have settled in on Delphi, covering interests such as model cars, rocketry, theology, the hearing impaired, the IBM PC, the Apple Macintosh, and personal computer art. The latter two SIGs offer extensive program libraries. Also worth mentioning is the Close Encounters SIG, which seems to be used primarily for heated debates on feminist issues. Never before has the war between the sexes been waged with such vigor in ASCII text.

Running a close second to the SIGs in popularity is Delphi's conferencing system. Delphi conferences tend to be more genteel than those found on other CB networks. While CompuServe's CB Simulator may give you the feeling that you've landed in Times Square, and People/Link's service makes you feel like you're trapped in a French farce, chatting on Delphi is more akin to strolling into the local university club.

It's easy to settle into long, earnest discussions on Delphi. Aimless chatter and fluff are kept at a minimum. One reason may be that Delphi has fewer subscribers during peak hours than, say, CompuServe. Consequently, discussion groups are small.

The service has an international appeal, with subscribers in Europe, Japan, Australia, and South America. One evening I chatted with a gentleman from Hamburg, West Germany, who used Delphi to keep in touch with his son in the States. He told me Delphi was a favorite among German telecommunicators.

The conferencing system is also graced by some particularly sleek system software. Users can participate in a number of conferences simultaneously. They can send messages to other users, page them to

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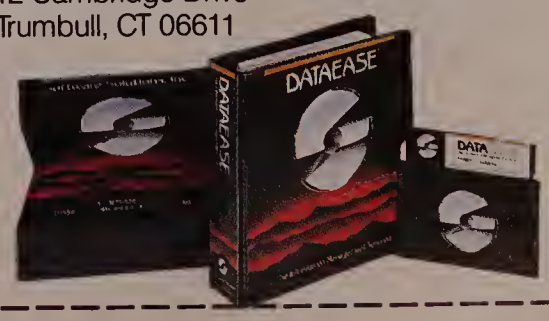

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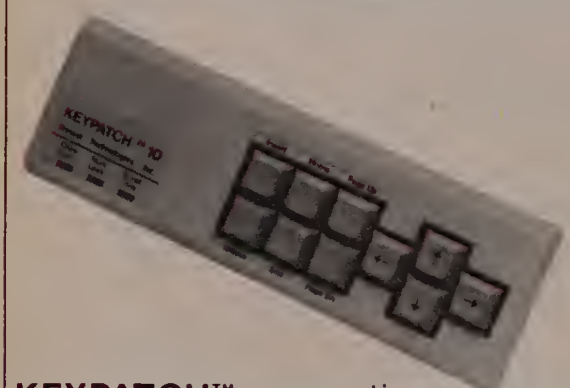

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join a conference, and get listings of all conferences in progress. They can also save a transcript of a conference for later perusal and encode discussions for privacy.

The forerunner of Delphi was a pioneering reference work called the Kussmaul Encyclopedia, which first went on line in 1980. In 1983 it reemerged as Delphi, a conferencing and BBS system, and over the next few years has expanded into an all-purpose information network.

According to one long-time subscriber, the service experienced serious setbacks about two years ago when General Videotex changed Delphi's operating system. Glitches were common, the system was frequently down, and frustrated subscribers were lost to other services.

Whether or not Delphi ever recovered is debatable. While General Videotex won't say exactly how many subscribers Delphi presently serves, Tully says subscribership has been growing at a rate of 12 to 15 percent for the past few months.

But subscribership isn't the only sensitive subject with Delphi management. The system has numerous technical frailties, including the fact that it's sometimes appallingly slow. Waiting 10 to 30 seconds for the system to respond to a command is not unusual. Delays are most common right after log-on—sometimes several minutes pass before the introductory menu scrolls across the screen.

The system is especially sluggish when overloaded. One evening I was refused admittance altogether; every time I tried to log on, a message appeared, saying, 'Maximum number of callers has already been exceeded. Please try later.' I would have discounted this as a chance accident were it not for other Delphi customers reporting the same problem. However, at press time, Delphi was implementing new system software intended to solve the problem.

Another interesting snafu is that Tymnet and Uninet callers are segregated from one another on the system and have no way to conference together. Tymnet callers are also segregated from direct-dial subscribers. Tully says this quarantine will be lifted soon, but as of this writing the problem's been festering for over a year.

Another drawback is the menu system. While Delphi's menus let any first-time caller navigate the service with ease, they leave the more experienced user chafing at the bit. The menus cannot be turned off, and to get from one point to another, you must fight your way through such a morass of menus that it makes more sense to turn off your modem and dial back in.

The menus are most troublesome in the electronic mail system. While Delphi's E-mail has some commendable features—such as its ability to accept XMODEM and Kermit transmissions, send Telexes, and transmit messages to other on-line services—its inefficiencies make it too sticky to recommend.

(continues)

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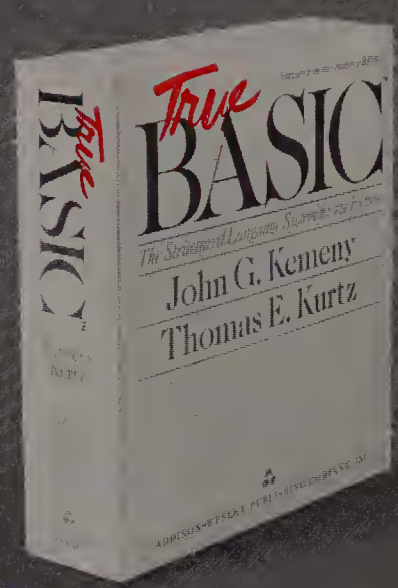

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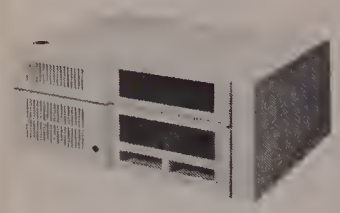

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Other problems haunt the service. In the SIGs, for example, there's no straightforward way to upload messages into the public forum. Many areas of the network are woefully incomplete: The library lists only two books in the bookshelf section and only seven newsletters in the newsletter department.

Delphi's documentation is also inadequate—especially in light of the extra $20 a subscriber must pay for a manual. If not for the excellence of its SIGs and conferencing, I'd be tempted to give Delphi a thumbs-down. Otherwise, Delphi is only a half-hearted effort.
—Judy Getts

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Steve Bosak is a reporter for the Chicago Tribune. *Judy Getts is a freelance science writer.*

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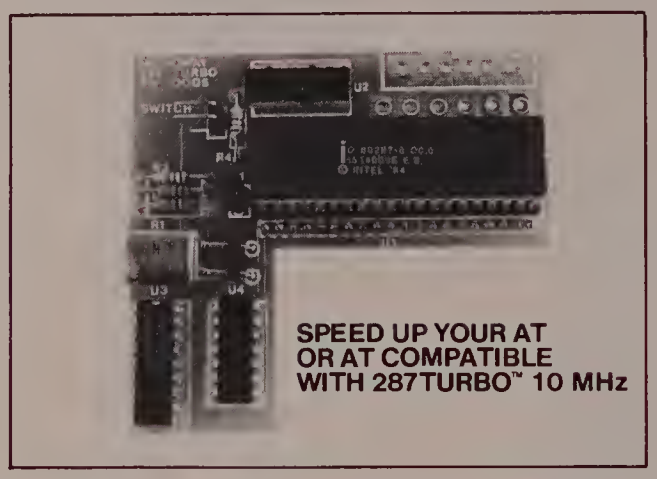

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The Help Screen

PC World offers answers and advice at every level

This month: DOS shows its colors (and redefines its function keys) via ANSI.SYS, and a DOS 3.10 bug is conquered—for potential profit.

Karl Koessel

The Wonderful World of Color

Q. I enjoy working with my XT, particularly when a program permits me to select the colors it displays. When working in BASIC, I often set the color with a command like COLOR 6; when I issue the command SYSTEM, the color remains until I use CLS, resetting the display to white characters on a black background. I'd like the color display to emulate a green or amber monitor; what's the secret?

Karen Schaefer
Aurora, Colorado

A. The DOS disk contains a device driver file called ANSI.SYS that can enhance the PC's rudimentary default screen and keyboard drivers. Once the ANSI.SYS driver is installed, it accepts commands that control cursor movement and clear the screen (see "Designer Screens," *PCW*, November 1985), reassign key definitions (see next item), and set screen color. ANSI.SYS is not, however, a panacea. While ANSI.SYS can give color to DOS, many programs—including the BASIC interpreter—bypass installed screen and keyboard drivers in favor of their own (complete with screen color choices and key definitions).

To install ANSI.SYS, copy that file from your DOS disk to the root directory of the disk you use to start the PC. With EDLIN or a word processor that can create ASCII files, edit (or create) the root directory's CONFIG.SYS file. Add to the beginning of the file the line **DEVICE=ANSI.SYS**. (Note that CONFIG.SYS must reside in the root directory. On a hard disk system, however, you can keep ANSI.SYS in another directory; for example, \DOS. In that case, assuming the hard disk is drive C:, the first line of CONFIG.SYS should be **DEVICE=C:\DOS\ANSI.SYS**.)

Save CONFIG.SYS and reset the PC with **<Ctrl>-<Alt>-<Del>**. Whenever the PC is started or reset, DOS looks to the root directory of the system disk for CONFIG.SYS, then installs the drivers indicated in that file.

ANSI.SYS commands consist of an Escape character (ASCII 27) followed by a short sequence of characters. When an Escape sequence is sent to the screen, ANSI.SYS intercepts it. If the Escape sequence is a valid ANSI.SYS command, the driver performs the appropriate function and the command is not displayed. Escape sequences that are not ANSI.SYS commands are ignored by the driver and displayed.

The DOS command PROMPT enables you to modify the DOS prompt to include Escape and the other characters used in ANSI.SYS commands. Because those characters are sent to the screen each time the prompt is displayed, PROMPT is commonly used to command ANSI.SYS. For example, with the ANSI.SYS driver installed, the command **PROMPT $e[1;33m$n$g <Enter>** will yield yellow characters. (*ng* specifies that the name of the default drive and the greater-than symbol are to be included in the DOS prompt—they are not ANSI.SYS commands. *$e* specifies the Escape character, which cannot be entered directly from the keyboard.)

Of course, remembering the ANSI.SYS code number for a particular color is difficult. The batch

(continues)

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```
echo off
cls
echo Please wait...
if %1.==. goto help
goto %1
:normal
 prompt $e[0m
 goto exit
:bright
 prompt $e[1m
 goto exit
:reverse
 prompt $e[7m
 goto exit
:black
 prompt $e[30m
 goto exit
:red
 prompt $e[31m
 goto exit
:green
 prompt $e[32m
 goto exit
:brown
 prompt $e[33m
 goto exit
:blue
 prompt $e[34m
 goto exit
:magenta
 prompt $e[35m
 goto exit
:cyan
 prompt $e[36m
 goto exit
:white
 prompt $e[37m
 goto exit
:backblack
 prompt $e[40m
 goto exit
:backred
 prompt $e[41m
 goto exit
:backgreen
 prompt $e[42m
 goto exit
:backbrown
 prompt $e[43m
 goto exit
:backblue
 prompt $e[44m
 goto exit
:backmagenta
 prompt $e[45m
 goto exit
:backcyan
 prompt $e[46m
 goto exit
:backwhite
 prompt $e[47m
 goto exit
:exit
 shift
 echo on
 echo off
 cls
 echo Please wait...
 if not .==.%1 goto %1
 prompt $p$g
 goto done
:help
 type color.hlp
:done
```

Listing 1: The batch file COLOR.BAT reduces the process of setting DOS's screen colors to typing color names on the command line.

file COLOR.BAT (Listing 1) modifies a listing from "Designer Screens" and eliminates the need for an elephantine memory or an ANSI.SYS Set Graphics Rendition (SGR) chart. Enter and save COLOR.BAT and COLOR.HLP (Listing 2). With COLOR.BAT, DOS's screen colors can be set using English.

The command COLOR NORMAL BLACK BACKCYAN, for example, produces black characters on a cyan background. The parameter NORMAL is included first to ensure that the intensity attribute is off—with intensity on, the parameter BLACK produces gray characters.

If COLOR.BAT is called without a subsequent parameter or with the parameter HELP, the

(continues)

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```
ANSI.SYS and CONFIG.SYS (containing
   the line DEVICE=ANSI.SYS) must be
   accessible when the PC is started.
Type COLOR and then your choice(s) of
   character intensity and/or color,
   and/or background color (indicated
   by the prefix 'back') selected from
   the following list of parameters.
For color displays:
        black           backblack
        red             backred
        green           backgreen
        brown           backbrown
        blue            backblue
        magenta         backmagenta
        cyan            backcyan
        white           backwhite
For color and monochrome displays:
        normal
        bright
        reverse
For example: COLOR bright red backgreen
```

Listing 2: COLOR.HLP, the help screen for COLOR.BAT, is a simple ASCII text file.

help screen COLOR.HLP is displayed. It contains instructions for using COLOR.BAT and lists the batch file's valid parameters. Note that COLOR.BAT operates with ECHO off. When ECHO is off, the DOS prompt is not displayed; ANSI.SYS commands contained in the prompt will not be executed until ECHO is turned on and the prompt is displayed. COLOR.BAT thus executes an ECHO ON after each PROMPT/ANSI.SYS command. Just before ending, COLOR.BAT issues the command PROMPT pg, specifying that the DOS prompt consist of the current path followed by the greater-than symbol.

ANSI.SYS Takes the Keys

Q. I've been thumbing through The Fully Powered PC *(Simon & Schuster, New York, 1985), and, on the whole, I'm quite satisfied. I am, however, frustrated by a section of the book (and by* PC World's *November excerpt, "Designer Screens") that notes that ANSI.SYS can redefine the DOS function keys but fails to describe how. For those of us not inclined to immediately buy a keyboard macro program (or the pricey* DOS Technical Reference *manual), can you shed some light on ANSI.SYS key redefinition?*

Steve Redmond
Boise, Idaho

A. First, keep ANSI.SYS key redefinition in perspective. To cite *The Fully Powered PC*, "ANSI.SYS enables you to redefine keys, although this capability is negligible

(continues)

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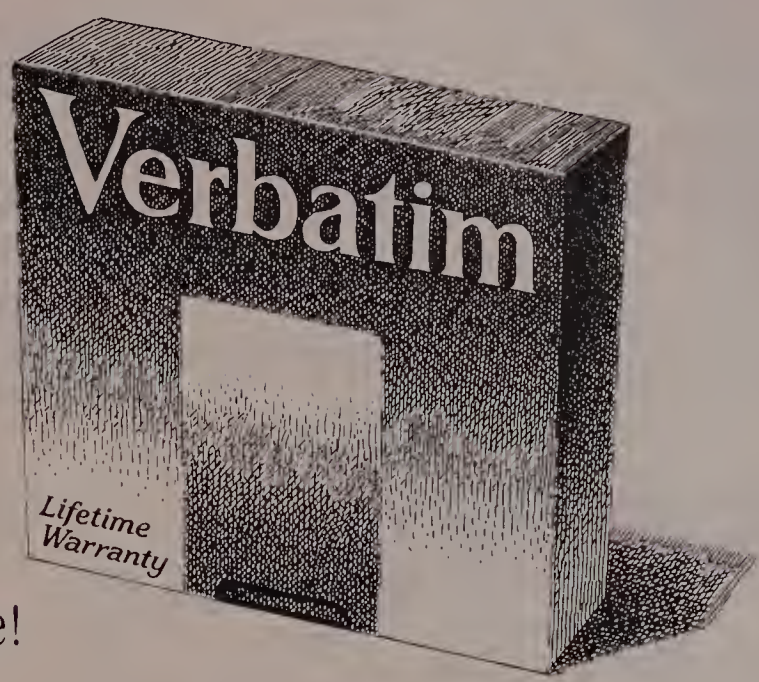

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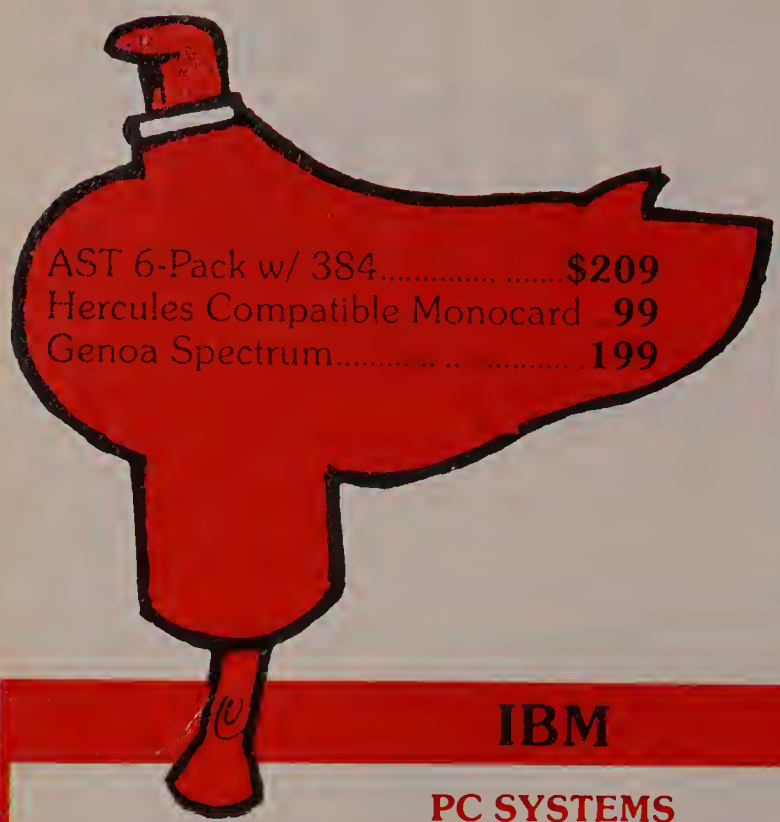

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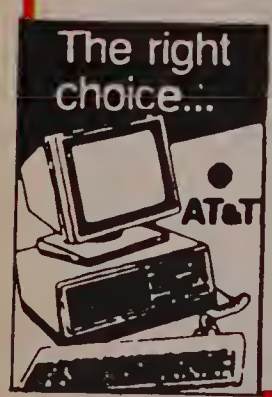

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cls
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if ON==%1 goto on
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goto help
:on
echo on
prompt $e[0;59;"DIR "p
prompt $e[0;60;"TYPE "p
prompt $e[0;61;"COPY "p
prompt $e[0;62;"ERASE "p
prompt $e[0;63;"A: "p
prompt $e[0;64;0;64p
prompt $e[0;65;"B: "p
prompt $e[0;66;"C: "p
prompt $e[0;67;"D: "p
prompt $e[0;68;"A:BASICA "
prompt $e[0;120;"A:KEY ON";13p
prompt $e[0;129;"A:KEY OFF";13p
echo off
cls
echo The function keys have been redefined.
echo Press Alt-0 when you want to return the default DOS definitions.
echo Press Alt-1 when you want to restore these definitions.
goto end
:off
echo on
prompt $e[0;59;0;59p
prompt $e[0;60;0;60p
prompt $e[0;61;0;61p
prompt $e[0;62;0;62p
prompt $e[0;63;0;63p
prompt $e[0;64;0;64p
prompt $e[0;65;0;65p
prompt $e[0;66;0;66p
prompt $e[0;67;0;67p
prompt $e[0;68;0;68p
echo off
cls
echo The function keys have been returned to their default DOS definitions.
echo Press Alt-1 when you want to restore the KEY.BAT definitions.
echo Press Alt-0 when you want to return the default DOS definitions.
goto end
:help
echo Type KEY ON to activate KEY.BAT key definitions
:end
prompt $p$g
```

Listing 3: KEY.BAT uses ANSI.SYS commands to redefine DOS function key assignments.

compared to that of macro processors such as *ProKey, SuperKey,* and *Keyworks.*" As explained in the previous item, many programs (including the BASIC interpreter) displace installed screen and keyboard drivers with their own. Nevertheless, assigning definitions to DOS function keys remains extremely useful. I appreciate your frustration at the fact that your driver's instructions are sold separately and at an imposing price.

After installing ANSI.SYS as explained in the previous item, use the batch file KEY.BAT (Listing 3) to reassign the DOS function keys. KEY.BAT is adapted from a listing by Brian Mann in "Changing Keys" (*PCW,* Vol. 2, No. 3) and is fashioned on the same simple principle as COLOR.BAT. Once

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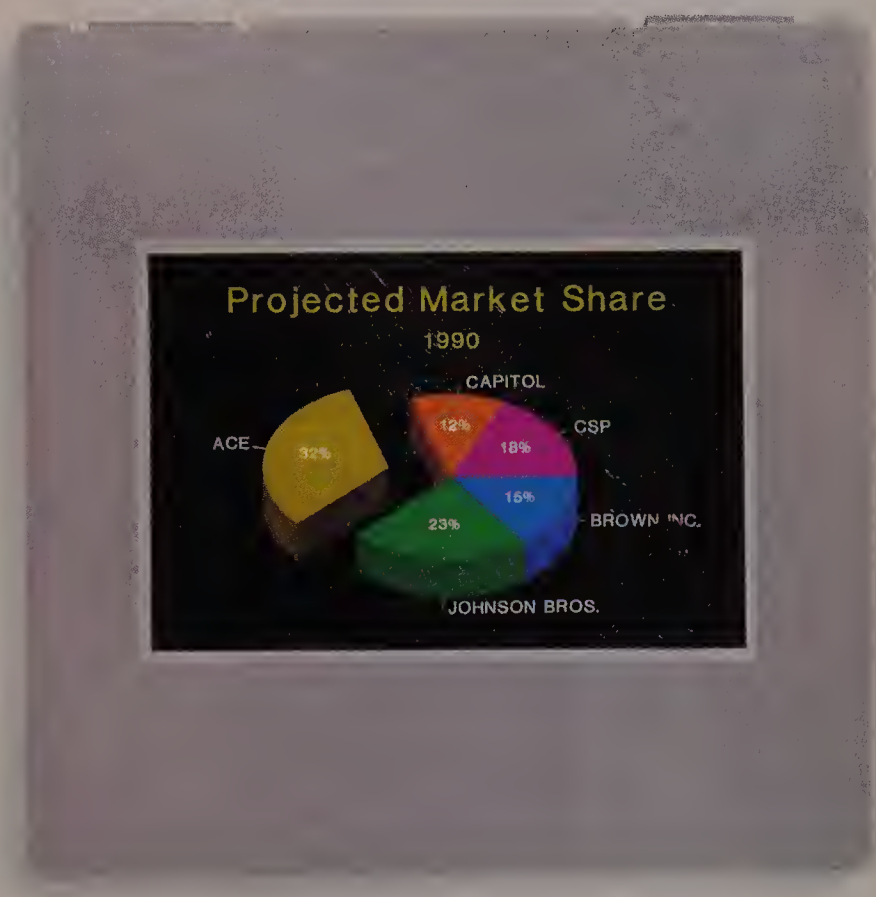

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it has been run, you can press <Alt>-0 to return the function keys to their default DOS assignments and press <Alt>-1 when you want to restore the definitions in KEY.BAT. You can obtain more information on redefining the keyboard with ANSI.SYS in "Changing Keys" as well as in "ANSI.SYS Key Reassignment" (*.*, *PCW*, Vol. 2, No. 6) and "Key Reassignments With DEBUG" (*.*, *PCW*, Vol. 2, No. 13). You may find the last item particularly worthwhile.

Circumventing a DOS 3.10 Bug

Q. While assembling a master floppy disk for a new product, I discovered a bug in DOS 3.10 that apparently hasn't been reported anywhere. I formatted a disk with the command FORMAT /B, thereby reserving space at the beginning of the disk so users could add the DOS system files. Next, I copied the relevant program files onto that disk. (This is the identical procedure I've used reliably to create master disks under DOS 2.10.) I then decided to play customer.

In attempting to make a bootable copy of the master disk, I used the DOS commands SYS and COPY to place the hidden system files (IBMBIO.COM and IBMDOS.COM) and COMMAND.COM onto the disk. I put the disk in drive A: and pressed <Ctrl>-<Alt>-<Del> to restart the PC. The screen cleared, the

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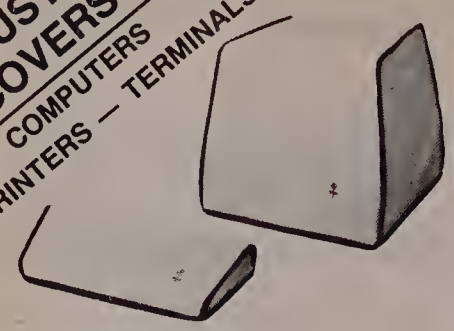

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cursor appeared, and drive A: started to whir. Just when it seemed the drive should have stopped, the screen displayed roughly half a line of binary code and several lines of greater-than (>) characters. DOS refused to load.

I repeated the procedure several times with various blank disks and other copies of DOS 3.10 and on two other PCs. The results didn't change. I spread the word on this problem via a few good local bulletin boards but received little response. I even considered delaying our scheduled product release date.

Microsoft denied responsibility for the IBM version of DOS and referred me to IBM in Florida. IBM suggested that I contact my dealer. I dutifully called my local IBM Product Center. After some delay, IBM confirmed that a problem did indeed exist with the /B option of the FORMAT command in DOS 3.10 and that no fix was available. I eventually received a copy of a Product Center memo explaining that "the FORMAT /B command under DOS 3.10 does not allocate enough space for the IBMBIO.COM system module on the target disk. As a result, the SYS command, which normally would make the disk bootable, does not work because the system module becomes fragmented after the transfer."

I understand that it's possible to use FORMAT /S to put the system files on the disk, add the product

(continues)

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files, and finally use a utility to "zero out" the IBMBIO.COM and IBMDOS.COM files. While DOS 3.10's SYS command will work on such a disk, DOS 2.xx's SYS command fails to produce a bootable disk. It's also feasible to instruct buyers to use FORMAT /S on a blank disk and then COPY the product files. The rub, however, is that the license agreement prohibits copying the product disk. In any event, the DOS 3.10 manual is explicit about how disks should be prepared for publication.

What's a software publisher to do? What does IBM suggest be done? Can you look into this and publish your findings?

Barry Wallis
Lombard, Illinois

A. I sympathize with your plight and that of others caught by glitches in the software revision process (especially at the operating system level) and by "help" that is plainly inadequate. The problem at hand, however, is to produce a master product disk whose duplicates will work with the SYS commands of DOS 2.00 through 3.10. Format a disk as you've done, using the FORMAT /B command. Next, copy a dummy file that consists of, for example, your company's name. Follow that by copying the product files to the disk. Finally, erase the dummy file using the DEL command. The disk space allocated by FORMAT /B plus the contiguous sectors freed by erasing the dummy file will accommodate the hidden system files

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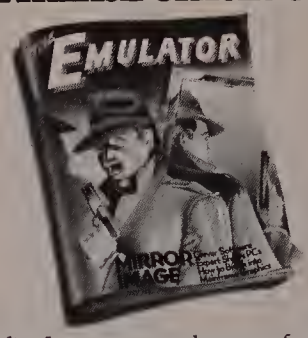

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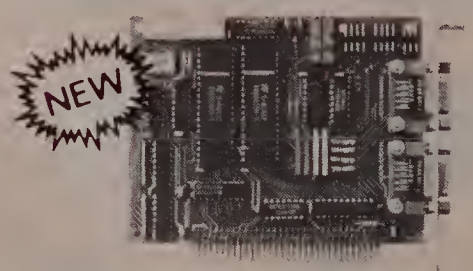

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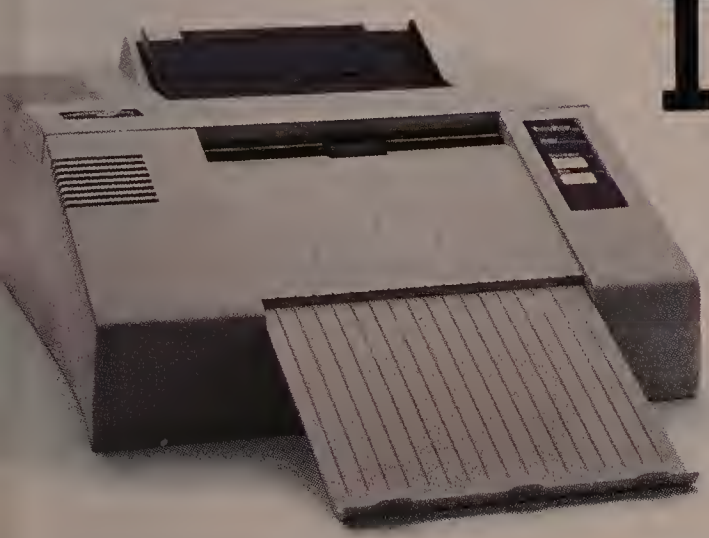

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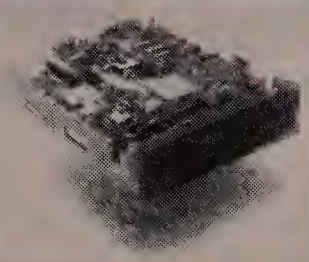

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64K RAM

Set of 9 chips, 200 or 150 Nanoseconds

$10 per set

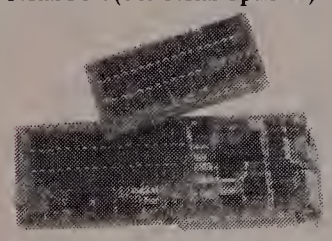
256K RAM $29

Set of 9 chips

150 Nanoseconds

PC's Limited AT Multifunction Card

- Expandable To 3 Meg (1.5 on Board/1.5 on Piggy Back Board)
- Supports 64 or 256K Rams
- Parallel Port
- Serial Port (2nd Serial Optional)



$199 w/0K

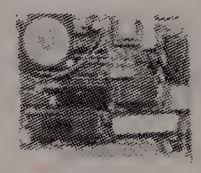
Piggy Back Board $59 w/0K

PC's Limited Mini I/O

- Serial Port
- Parallel Port
- Clock
- Software
- Fits In Short Slot

$99

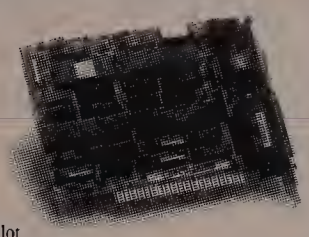
300/1200 Baud Hayes Compatible Modem Fits in Short Slot



$159

UNIVERSAL GRAPHICS CARD II

$199

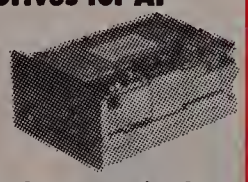


- Fully compatible with IBM CGA, Plantronics COLORPLUS, IBM Monochrome, and Hercules compatible graphics modes.
- Includes Parallel Port and fits in a "short" slot.

Seagate

20 30 and 40 MEG High Speed 40 MS Access Time Hard Drives for AT™

Uses Linear Voice Coil Activator.



Heads park automatically at power down.

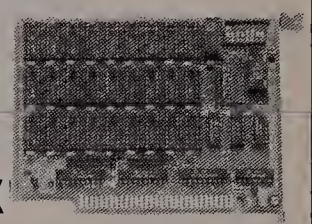
20 MEG $579
30 MEG $699
40 MEG $819

Includes Seagate Full Height Hard Disk, Cable, and Mounting Rails.

Boots from Hard Disk. One Year Warranty.*

PC's Limited PC-576 RAM Board

- Expandable to 576K
- Supports 64K or 256K RAMS
- Fits in Short Slot



$69 W/OK

PC'S LIMITED Six Function Card

- Upgradable to 384K
- Clock/Calendar
- Includes Software
- Parallel Port
- Serial Port
- Game Port

Two Year Warranty *

w/0K $99 w/384K $149

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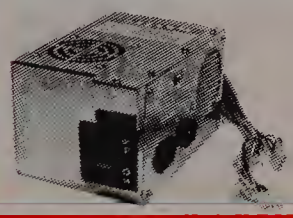

Directly replaces power supply in PC.™ Fully XT™ compatible. One Year Warranty *

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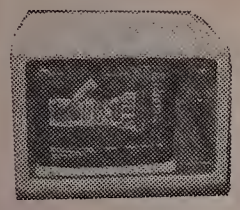

- 12-inch screen
- Amber
- Compatible with monochrome or color graphics cards

PC'S LIMITED RGB-1 MONITOR

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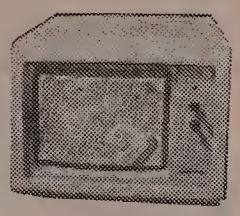
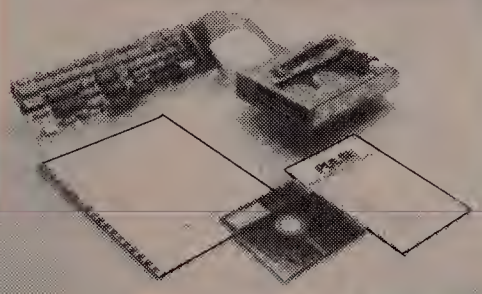


- .31MM dot pitch
- RGB input
- 12-inch screen
- 690X240 resolution
- 16 colors

Wangtek 60 MEG Tape Backup System

- Backs up 5 Megs per minute
- Runs under MS DOS or PC DOS, Novell, Xenix
- Pulse Software Included

$795



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20 MEG Hard Disk System for PC™

Internal $409

Includes Tandon Hard Disk, Western Digital Controller, Cables, Manual, Software, and Mounting Hardware. Boots From Hard Disk One Year Warranty

Or add a second 20 MEG Hard Drive to your system with the PC's Limited Hard Disk Kit—Two 20 MEG Hard Disks daisychained together, plus a controller card—**$695.**

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When shopping for PC products, ask our competitors about *their* refund policies.

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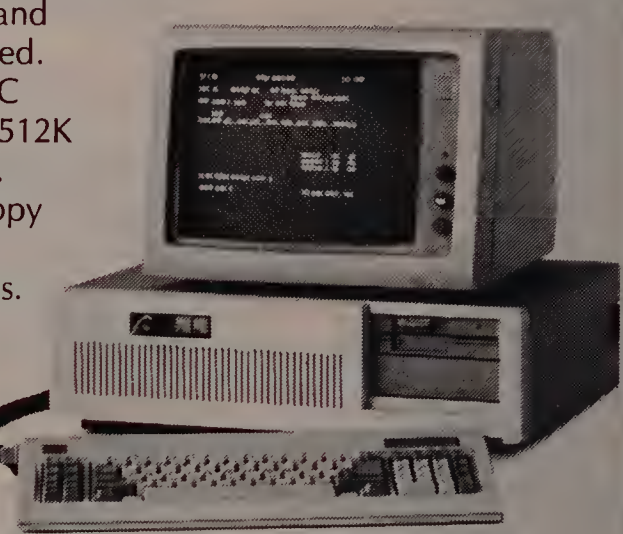

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102. **Maxell** 3½ inch SS/DD MF1 ..... **$1.60/ea.**
103. **Maxell** 3½ inch DS/DD MF2 ..... **$2.35/ea.**
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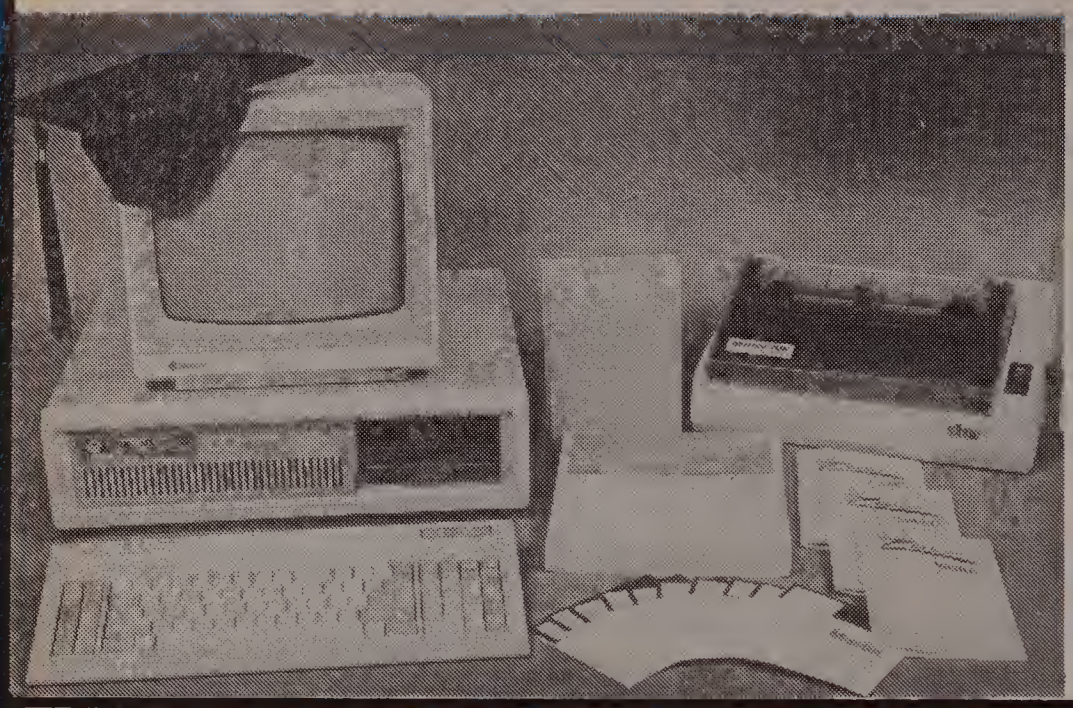

Computer-IBM compatible Turbo-XT system with Intel 8088-2 (4.77-8 MHz, keyboard selectable). 256K RAM expandable to 1 MB on main board. Clock/calendar, game port and 8 expansion slots on main board. Half-height, double-sided diskette drive, diskette drive controller, monochrome adapter card with parallel port, 135 watt power supply and AT™ style keyboard.

Monitor-High resolution (750X350) amber monochrome monitor with 12" screen.

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Accessories-200 sheets continuous form paper, printer cable & box of 10 blank diskettes.

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- Intel 80286 processor
- MS DOS 3.1 included
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- 1.2 MB Floppy Controller
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- 8 MHz option included free

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8 MHz option included Free!

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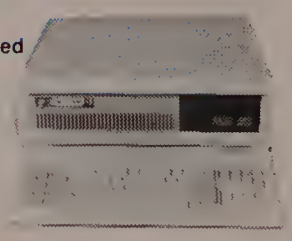
- Intel 8088-2 (4.77 or 8 MHz)
- Keyboard selectable clock speed
- Up to 70% faster processing
- STD-5160 AT style keyboard
- 256K RAM • 8 expansion slots
- 1-half height floppy drive



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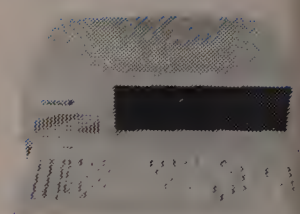
Standard-88

- Intel 8088 (4.77 MHz)
- 1-half height floppy drive
- STD-5150 keyboard
- 135 watt power supply
- 8 expansion slots
- 640K RAM



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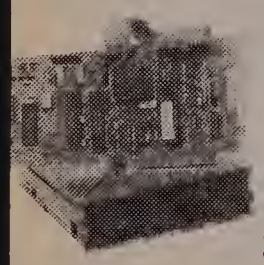
Hard Disk Kits for IBM PC™



Convert your PC to an XT with our hard disk kit. Complete with hard disk controller, cables, manual, mounting hardware and easy-to-use software.

20MB **$415**
30MB... **$539**

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Kit includes 3½" shock mounted hard disk, hard disk controller, cables, manual and software.

Plus A One Year Warranty!

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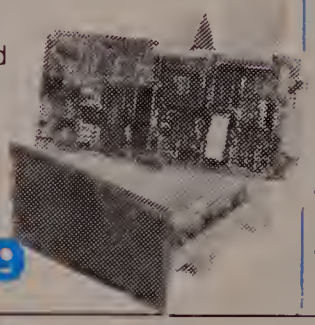
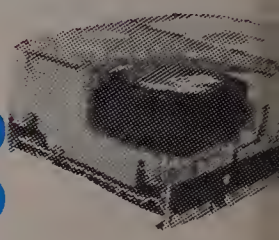


Hard Disk Kits for IBM AT

High performance, fast access
Includes: cables, manual and mounting rails.

20MB. **$549**
30MB. **$629**



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LQ-800	$619
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FX-286	$579
FX-85	$399
192	$365
193	$549

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intel Math Co-Processor

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80287	$219
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Memory

9 Chips Per Set
1 Year Warranty

64K	$10
256K	$29

TEAC or Panasonic

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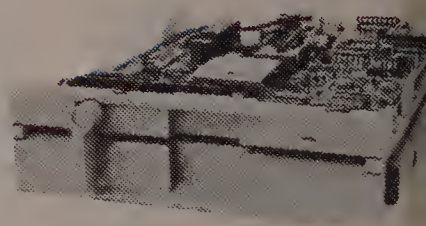
360K Floppy Drive for the IBM AT



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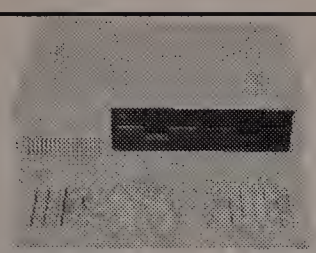

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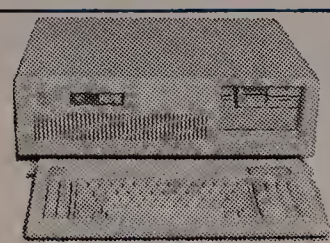

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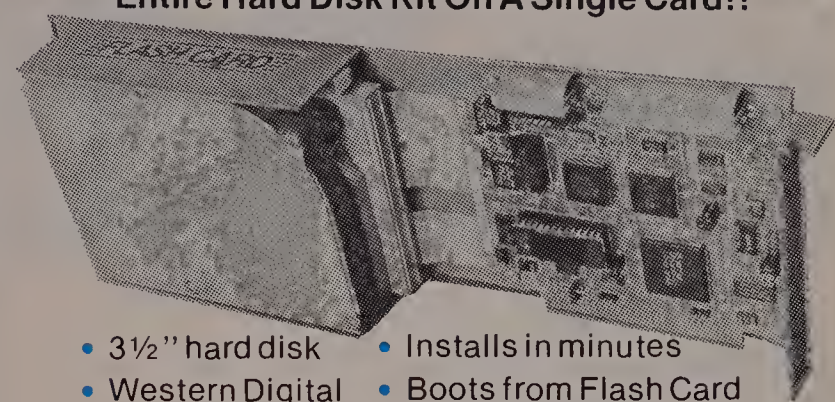

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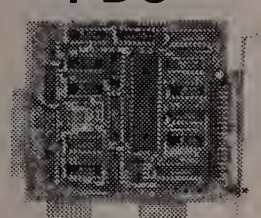

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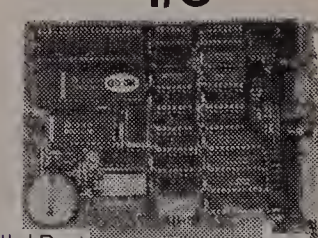

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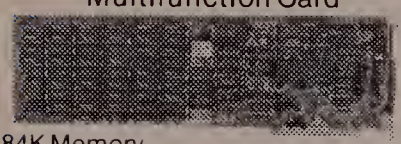

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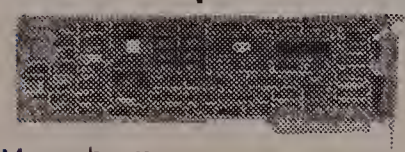

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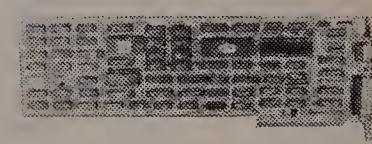

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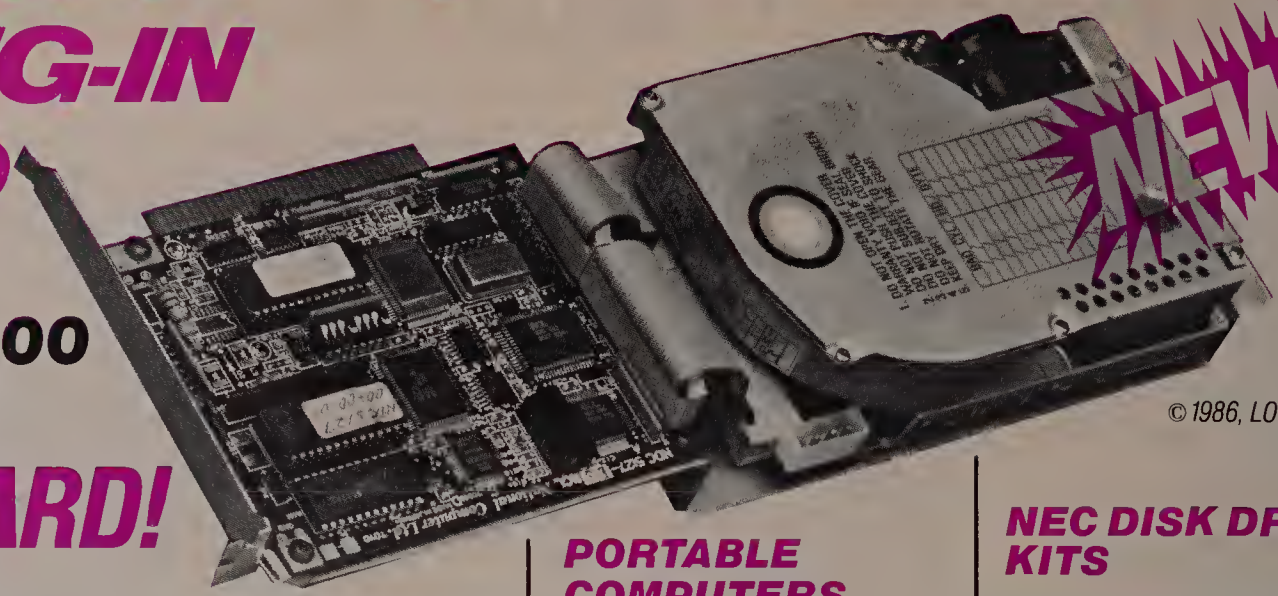

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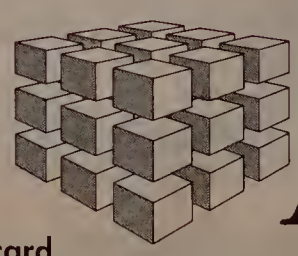

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310 Amber IBM-TTL.....$169.00
410 White or Green TTL.....CALL
Color 600 Hi-Res (640x240).....$399.00
Color 722 IBM Enhanced.....$529.00
Color 725 (AT&T Compat.).....$619.00
Color 730 Analog.....$799.00

MAGNAVOX
515 RGB/Composite.....$299.00
613 TTL Green.....$99.99
623 TTL Amber.....$99.99

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JB 1270 G/JB 1275 A (ea.)..... $99.00
JB 1280 G TTL/1285 A TTL(ea.) $139.00
JC 1401 Multi Sync RGB.....CALL

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HX-9 9" RGB.....$469.00
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HX-12 12" RGB.....$469.00
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5510 Dot Matrix.....CALL
5510C Color.....CALL
6000 Letter Quality.....CALL
6100 Letter Quality.....CALL
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6300 Letter Quality.....CALL
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Okimate 20 (IBM), 282, 283.....CALL

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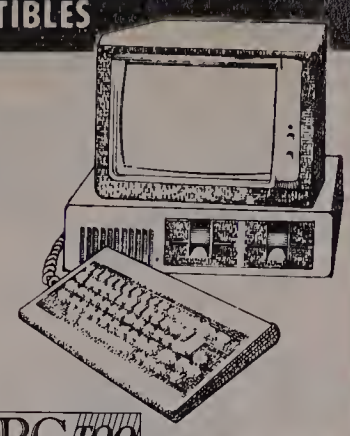

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Master Piece + ... $119.99

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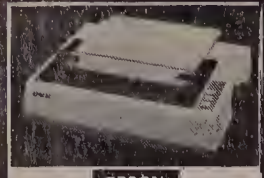

EPSON

Epson FX-85 — 160cps, NLO . . $379
FX-286 –Emulates IBM ProPrinter $569
LX-80 — 80 col., NLO mode . . $249
LO-800 — 80 col., 24-pin head . $575
LO-1000 — 132 col., 24-pin head $749
DX-20 — 20cps Daisywheel . . . $395
DX-35 — 35cps Daisywheel . . . $699

OKIDATA

182P, 120 cps, 80 Col., Parallel . .$239
84P, 200 cps, 136 col. Parallel. . $649
192P, 160 cps, 80 col. Parallel . . $365
193P, 160 cps, 136 col. Parallel. . $495
293P, 200cps, 136 column, colors $495
Parallel or Serial I/F Card for 293. $95
2410P, 350 cps, 136 col. Parallel $1896

IBM

IBM ProPrinter — 200cps, 80 col .$399
Proprinter XL — above but 132 co $625
IBM Color Jet — 80 column $645
IBM QuietWriter II - 60cps, 132 c $1,295
IBM Wheel Printer — 25cps, 132 $1,445

NEC

3550 - 33 CPS, 203 col., proportional space, bi-directional, parallel. $795
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P351 — 288cps, 24-pin head. . $999

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MSP-10 — 80 column. $299
MSP-15 — 132 column $399
MSP-20 — 80 column. $389
MSP-25 — 132 column $579

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SB-10, 24-pin, 80 column $450
SG-10/15, SD-10/15, SR-10/15 . . Call

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3320 — 300cps, parallel & serial . Call
3404 — 400cps, serial interface . . Call

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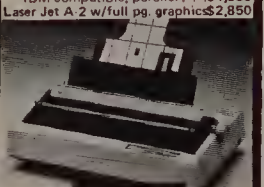
H-P ThinkJet Ink Jet Printer 150cps, 80 col., 11x12-dot text. .$399
H-P LASERJET PRINTER 300cps, quiet operation, serial. $2,395
H-P Laserjet Plus, Model 300 . $3,150
H-P Laserjet 500 w/tray $3,995

Canon

Canon Laser Jet A-1, comes w/4 fonts, downloadable to 20 fonts max. IBM compatible, parallel. . .$1,950
Laser Jet A-2 w/full pg. graphics $2,850



BROTHER

M-1109 — 100cps, 25cps NLO, 80 col. 2K buffer, dual interface. . . $199
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Tractor for HR-15 . . . . . .$119
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TwinWriter — Two heads are better than one! 160cps dot matrix and 36 cps daisywheel combined into one printer. Parallel interface . . .$985
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HR-35 — 36cps daisywheel, para .$725
DM-40 — 160cps, 24-pin dot matrix, 136 col., with tractor, para $899

FORTIS — *by Brother*

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Fortis DH45 — Dual head printer, 160 cps dot matrix, 36 cps daisywheel, Epson, Diablo compatible . . $985
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KX-P1091, 120 cps, 80 columns, with near letter quality mode . . $259
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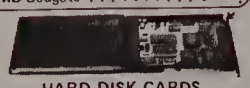

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I·MEGA

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10+10-MB . $1,950
20+20-MB . $2,450
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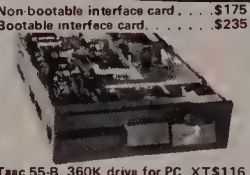

Tsac 55-B, 360K drive for PC, XT $116
Panasonic Drive, 360K for PC, XT $115
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Internal half height unit. Direct connects to floppy controller card without taking up a slot. Complete w/$30 tape, software and instruction. $395

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360K DRIVE FOR IBM-AT

AST

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Memory installed on card with parallel, serial ports & clock	64K	256K	384K
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above plus game port	$214	$234	$260

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Paradise Color/Mono Card $199
AST Preview graphics w/para. . . $249
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Persist BOB Board — Ultra hi res color card. Ideal for Taxan 630/640 $389
Everex The Edge $275
Everex Graphic Edge $295
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Ultra Pak by Tzang Lab $485
Tecmar Graphic Master. $465
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Controller card for 2 floppy drives plus parallel, serial, game ports & clock/calendar w/battery all in one card. $145

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Compatible with IBM Color Graphics card, w/parallel port . . .$95

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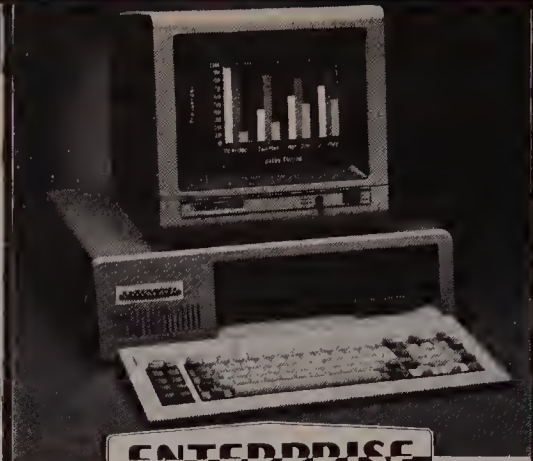

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- Serial Port
- Game Port
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- Runs IBM PC-DOS

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$549	$825	$1275	$1850
640K memory No Drive	2-360K Drives	2-360K and 20-MB drives	2-360K, 20-MB and Tape B/U

ENTERPRISE XT-Plus (4.77-8 MHZ)

$699	$950	$1495	$2050
640K memory No Drive	2-360K drives	2-360K and 20-MB Drives	2-360K, 20-MB and Tape B/U

ENTERPRISE AT (6-8 MHZ)

$1550	$1650	$2250	$2895
512K memory 1.2-MB Drive	1.2-MB and 360K drives	360K, 1.2-MB, 20-MB drives	1.2-MB, 20-MB and Tape B/U

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- 704K RAM on motherboard
- Full IBM compatability
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- Made in USA
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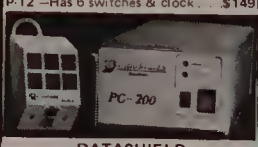

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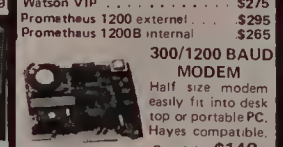

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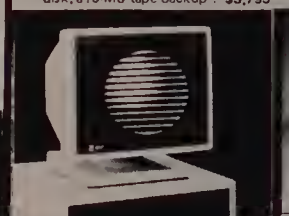

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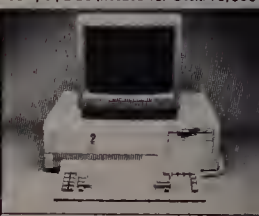

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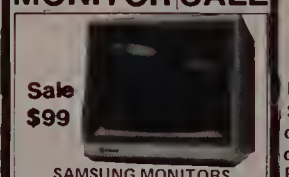

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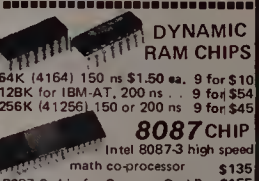

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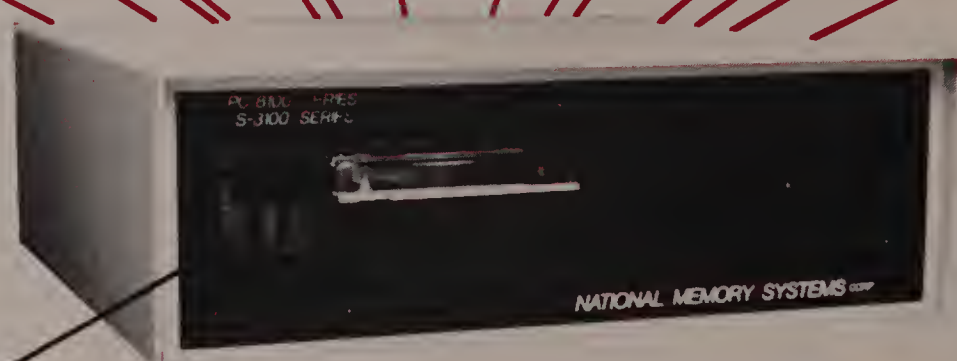

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Homemade "pop-up" footnotes for 1-2-3, a potent way to speed up file copying, a fleet prime-number cruncher, a handy tax log for IRS insurance, and more

Edited by Steven Cook

Effortless List Generation

If you need to print names and addresses—or want labels to appear without extra spaces between them—try the *1-2-3* macro shown in CONCAT. It combines two worksheet labels into one.

Type the lines shown in CONCAT into a single worksheet column. (Do not type the line numbers, only the contents.) Be sure to leave lines 10 and 12 blank. When you're through, use the /Range Name Create command to name the first cell \A; name the cells in lines 10 and 12 MACCITY and MACSTATE, respectively.

During execution, the macro assigns the name CITY to the current cell and the name STATE to the cell to the immediate right of CITY. Next, it moves to the right of the STATE cell and clears a place to store the combined city and state labels, then copies the contents of CITY and STATE to the MACCITY and MACSTATE cells, which are within the macro itself.

Line 6 creates the range name CONC, which covers the three cells from MACCITY to MACSTATE and is used by the /XI instruction in line 7 to determine whether MACCITY or MACSTATE is empty. If either is, the macro terminates; otherwise, the macro invokes EDIT mode, types a comma, moves to the left of the comma, then uses the contents of MACCITY (line 10) to generate the keystrokes that type the city name into the current cell. It then moves beyond the comma and uses the contents of MACSTATE (line 12) to type the state name. The tilde in line 13 terminates the entry, which now consists of the combined city and state names. The last few lines remove the CITY and STATE range names, move execution down to the next row, and reexecute the macro. This enables an entire list to be processed without operator intervention.

Don Druker
Rockville, Maryland

Editor's note: String concatenation is a built-in feature in release 2 of 1-2-3, *but you'll find this technique very helpful if you're using release 1A. The following item uses concatenation to combine two labels to form a file name.*

Fetching Footnotes

A few commercial utilities now enable you to annotate *1-2-3* worksheet cells, but all seem to be RAM resident—which can be problematic if your worksheets, like mine, already fill available memory. I've long needed a way to maintain about 100 such footnotes on disk, but the method had to display information rapidly and require no special expertise.

The obvious solution was to use the /File Import Text command to retrieve footnotes from disk; the difficulty arose in devising a method to tie a footnote to a specific cell. My technique uses the {END} function and the /Worksheet Titles command; it is implemented by the macro shown in NOTEMAC.

Enter NOTEMAC on an unused area of the worksheet. Next, use the /Range Name Create command to assign the name TEXTSPOT to another unused area of the worksheet (where footnote text will appear). You must also name the macro itself so it can be called from the keyboard (I use

(continues)

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```
1.      '/rncCITY~~{right}
2.      '/rncSTATE~~
3.      {right}{right}/re~
4       '/cCITY~MACCITY~
5.      '/cSTATE~MACSTATE~
6.      '/rncCONC~MACCITY.MACSTATE~
7.      '/xi@COUNT(CONC)<3~/rndCITY~/rndSTATE~/xq
8.      {edit},
9.      {home}
10.
11.     {right}{right}
12.
13.     ~
14.     {goto}CITY~
15.     '/rndCITY~/rndSTATE~
16.     {down}
17.     '/xg\A~
```

CONCAT: Macro to concatenate labels in 1-2-3 release 1A. Use the /Range Name Create command to assign the name \A to the cell in line 1, MACCITY to the empty cell in line 10, and MACSTATE to the empty cell in line 12.

```
1.      '/rncORIGIN~~
2.      '/wtb
3.      {end}{home}{end}{left}
4.      '/c~PART1~
5.      {end}{home}{end}{up}
6.      '/c~PART2~
7.      {goto}TEXTSPOT~/FIT
8.
9.
10.     ~
11.     '/wtc
12.     '/xmTEXTMNU~
```

NOTEMAC: 1-2-3 macro to create worksheet footnotes. Blank cells in lines 8 and 9 must be assigned range names PART1 and PART2, respectively.

\E), and assign the names PART1 and PART2 to the two blank cells within the body of the macro.

On the worksheet row below the last row used, enter the letter name of each column (one name per cell) so that the first cell contains the letter A, the second B, and so on. Likewise, add a column to the right of the last one used; in this column, enter labels containing the number of each row. The first row holds the label '1, the second '2, the third '3, and so on—again, one for each row.

The macro concatenates the two labels to determine the file name of the corresponding footnote. Using column names and

(continues)

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row numbers, it's easy to link the text files containing the footnotes to the specific cells they describe. You can actually use anything you like in place of column names and row numbers, but every row and every column must contain an entry: The macro will stop in its tracks if it encounters a blank cell in the last row or column of the worksheet.

To create a footnote for cell G29, for example, you simply store the appropriate text in a file called G29.PRN. To retrieve a cell's footnote, place the cell pointer on the cell (for example, G29), then press <Alt>-E to invoke the macro. When the macro executes, it assigns the name ORIGIN to the current cell and issues the /Worksheet Titles Both command to lock in the current row and column. The {END}{HOME} sequence then moves the cell pointer to the last-used row and column in the worksheet (containing the row numbers and column names you previously entered); the {END}{LEFT} command directs the cell pointer to the left until it encounters the limit set by the /Worksheet Titles command.

Now the macro copies the column name stored in that cell into the cell named PART1, the middle of the macro itself. The {END}{HOME}{END}{UP} sequence moves the cell pointer back to the lower right cell and up to the limit set by the /Worksheet Titles command. This cell's contents are copied into the cell named PART2; the {GOTO} command then moves the cell pointer to TEXTSPOT, the area reserved for notes, and the /File Import Text command executes.

/File Import Text requests a file name that will consist of the contents of both PART1 and PART2 because those cells are located within the macro. The tilde in the cell below PART2 terminates entry of the file name, and text is then imported into the worksheet. /Worksheet Titles Clear removes the titles, and the /XM statement calls a menu [not shown] that I created to control footnote display. (The macro can be modified to return to the "origin" cell if desired.)

You can enhance this routine in a number of ways. One consists of placing values in the next-to-last row and the next-to-last column to permit logical controls. For instance, a 0 value could cause a branch to a 'No information available' message, and a 1 could read in the same text file for all cells in a row or column. This would enable you to annotate a large number of cells with relatively few text files.

Herbert E. Gladen
Timonium, Maryland

Alternate Configurations

I use several programs that require ANSI.SYS and have included it in my CONFIG.SYS file. Unfortunately, one program doesn't run if ANSI.SYS is present. In that case, I rely on a batch file that renames ANSI.SYS to ANSI.OFF, thereby preventing it from loading when the computer is restarted. Instead,

(continues)

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an innocuous error message appears when the CONFIG.SYS file executes.

My AUTOEXEC.BAT file contains the line IF EXIST ANSI.OFF REN ANSI.OFF *.SYS, which tests for ANSI.OFF. If ANSI.OFF is found, the line renames it ANSI.SYS, enabling it to load normally the next time the computer starts.

You can use a similar technique to temporarily eliminate any device driver from the CONFIG.SYS file. This capability is useful if hardware compatibility is an issue or if you want to reclaim memory otherwise occupied by a device driver that you need only sporadically.

Ronald Ogg
Orinda, California

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Suppose you need to use a command frequently within a batch file. You could use the SET command to store that command in

(continues)

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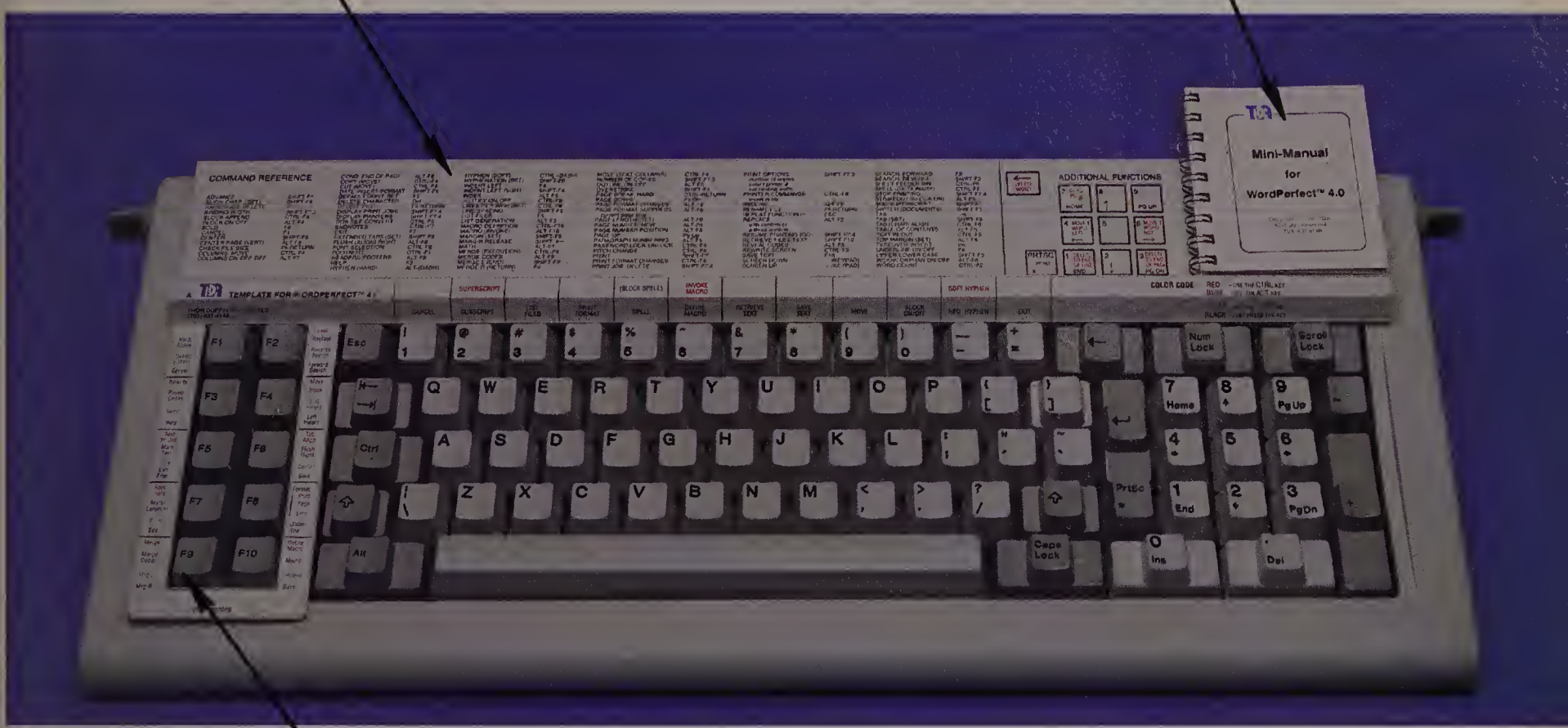

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```
echo off
cls
echo This is the top line on the screen
rem note: next line uses echo (space)(space)(percent)
set z=echo  %
%z%
%z%
%z%
%z%
echo and this text is four lines lower
rem following line removes z from environment
set z=
echo End of demonstration
```

SKIPLINE.BAT: Demonstration of DOS variables using the SET command

the environment under a short name (such as Z), and then use the variable %Z% within the batch file in lieu of the command itself. SKIPLINE.BAT illustrates such a situation.

Values remain in the environment until you remove them or restart the computer. Because of this, DOS variables can be enlisted to pass values between batch files. One batch file can set a value in the environment; subsequent batch files can test that value using the IF subcommand, or they can use the value directly as demonstrated in SKIPLINE.BAT.

Don G. Davis
APO, New York

Editor's note: DOS reserves 127 bytes for environment space and expands that amount automatically unless you've loaded memory-resident software such as GRAPHICS.COM or SideKick. *If you run out of environment space (which will be indicated by a DOS error message), use the technique outlined in "For Environmentalists,"* *.*, PCW, *April 1986.*

Turbo Primes

Joseph Gatewood's PRIMES.BAS program [*.*, *PCW*, November 1985] ran considerably faster than the routine used in the PC AT speed trials in "AT: The PC's Powerful Partner" [*PCW*, Vol. 2, No. 13], but I've developed a program that is faster still. My program, PRIMES2.BAS, will find all primes less than 1000 in just 14 seconds (more than twice as fast as the Gatewood program, which requires 32 seconds). For numbers above 1000, the speed difference is even more pronounced.

PRIMES2.BAS maintains an array of markers, one for each number in the range to be calculated. Once each number is evaluated, the program steps through the array by multiples of that number and marks each of those array positions with a 1. Next, the program increases the value to be tested by 1 and checks the array to see if that value's position has been marked. If it has not, the value is displayed on screen, and its multiples in the array are

(continues)

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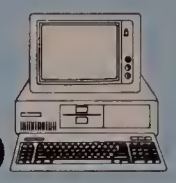

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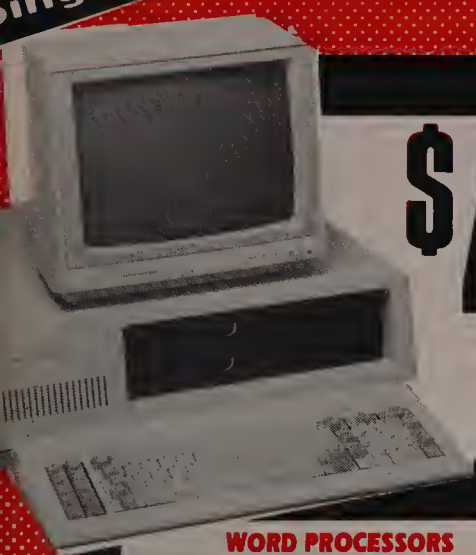

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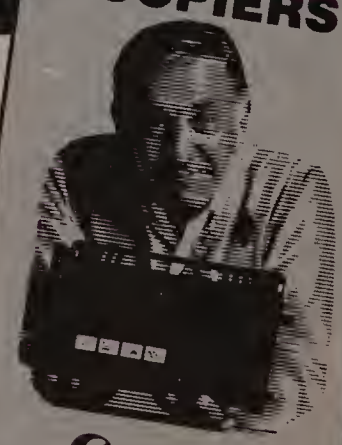

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```
100 CLS: KEY OFF: DEFINT A-Z
110 INPUT "Primes up to: ",N
120 CLS: DIM M(N): T1$=TIME$ : PU$=STRING$(LEN(STR$(N)),"#")
130 FOR C=2 TO N
140    IF M(C) THEN 190
150    PRINT USING PU$; C;
160    FOR L=C*2 TO N STEP C
170       M(L)=1
180    NEXT
190 NEXT
200 T2$=TIME$: PRINT :PRINT
210 T1=3600*VAL(MID$(T1$,1,2))+60*VAL(MID$(T1$,4,2))+VAL(MID$(T1$,7,2))
220 T2=3600*VAL(MID$(T2$,1,2))+60*VAL(MID$(T2$,4,2))+VAL(MID$(T2$,7,2))
230 PRINT "Calculations took";T2-T1;"seconds."
240 END
```

PRIMES2.BAS: Speedy prime-number-generation program

marked. This process continues until all values in the range have been tested. Note that PRIMES2-.BAS will run even faster if you delete line 150.

Thomas C. Myers, Jr.
Mobile, Alabama

On the MOVE Again

Though I knew about the DOS function call that renames files and subdirectories, I hadn't attempted to use it until I saw the MOVE.COM program in *PC World* [*.*, *PCW*, February 1986].

I've developed a version of MOVE.COM called MOVEALL-.COM. The difference is that MOVEALL.COM can move entire groups of files from one subdirectory to another. That is, MOVEALL.COM accepts the standard DOS global file name characters ? and *. MOVEALL-.COM uses DOS function calls to find the first file that matches the global file name specification, then calls the DOS rename function REN to change subdirectory information for that file. The process is repeated for subsequent matching file names.

To use MOVEALL.COM, change to the subdirectory to which you want the files relocated and type **MOVEALL**, followed by the path and file specification of the files you wish to move. For instance, to move all files with the .BAS extension from the subdirectory DATA into the current subdirectory, you'd type MOVEALL \DATA*.BAS <Enter>. The command MOVEALL \WORK\LETTERS\AUG*.* moves all files that begin with AUG out of the subdirectory \WORK\LETTERS and into the current subdirectory.

Gordon Richardson
Cape Town, South Africa

Editor's note: To create MOVEALL.COM, load BASIC, type in the lines shown in MOVEALL, type **RUN**, and press **< Enter >**. *MOVEALL.COM requires DOS version 2.00 or later.*

(continues)

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```
10 DEFINT A-Z:CLS:KEY OFF:DEF FNHEX(X$)=VAL("&h"+X$)
20 LOCATE 3,1:PRINT "X-Maker":READ F$
30 LOCATE 5,1,1:PRINT "Now testing for data errors...please wait";
40 SUM=0:READ LN:IF LN<0 THEN 80
50 READ H$:IF VAL(H$)<0 THEN 70
60 SUM=(SUM+FNHEX(H$))*2:SUM=(SUM\256)+(SUM MOD 256):GOTO 50
70 READ CKSUM$:IF SUM=FNHEX(CKSUM$) THEN 40 ELSE GOTO 170
80 RESTORE:CLS:LOCATE 3,1:PRINT "X-Maker":READ F$
90 LOCATE 5,1,1:PRINT "Press any key except ESC to create ";F$;": ";
100 A$=INPUT$(1):PRINT:IF A$=CHR$(27) THEN END
110 LOCATE 6,1:PRINT "Working...";
120 OPEN F$ AS #1 LEN=1:FIELD #1,1 AS BX$
130 READ LN:IF LN<0 THEN 160
140 READ H$:IF VAL(H$)<0 THEN READ CKSUM$:GOTO 130
150 LSET BX$=CHR$(FNHEX(H$)):PUT #1:GOTO 140
160 CLOSE:PRINT:PRINT F$;" has now been created.":END
170 PRINT:PRINT "Error in DATA line";STR$(LN);" :"
180 PRINT "Check your work.":BEEP:END
1000 DATA "a:moveall.com"
1010 DATA 1,E8,36,00,E8,45,00,E8,5C,00,E8,6F,00,E8,7D,00,BE,-1,1A
1020 DATA 2,9E,00,89,EF,B9,0D,00,F3,A4,BA,C0,00,BF,9E,00,B4,-1,77
1030 DATA 3,56,CD,21,72,0B,E8,78,00,B4,4F,CD,21,73,DE,CD,20,-1,47
1040 DATA 4,BA,C1,01,B4,09,CD,21,CD,20,B4,30,CD,21,3C,02,72,-1,B2
1050 DATA 5,01,C3,BA,EA,01,B4,09,CD,21,CD,20,8A,0E,80,00,30,-1,0B
1060 DATA 6,ED,B0,20,BF,81,00,F3,AE,4F,41,89,FE,BF,C0,00,F3,-1,A7
1070 DATA 7,A4,C6,05,00,C3,BA,C0,00,B9,20,00,B4,4E,CD,21,72,-1,7B
1080 DATA 8,01,C3,BA,A8,01,B4,09,CD,21,CD,20,BF,FF,00,B9,40,-1,8B
1090 DATA 9,00,B0,5C,FD,F2,AE,47,47,89,FD,FC,C3,BE,9E,00,B9,-1,14
1100 DATA 10,0D,00,AC,3C,00,74,08,88,C2,B4,02,CD,21,E2,F3,C3,-1,6C
1110 DATA 11,BA,BE,01,B4,09,CD,21,C3,50,61,74,68,20,6F,72,20,-1,AE
1120 DATA 12,66,69,6C,65,20,6E,6F,74,20,66,6F,75,6E,64,0D,0A,-1,2F
1130 DATA 13,24,20,46,69,6C,65,20,41,6C,72,65,61,64,79,20,65,-1,70
1140 DATA 14,78,69,73,74,73,20,69,6E,20,74,68,69,73,20,64,69,-1,91
1150 DATA 15,72,65,63,74,6F,72,79,0D,0A,24,4D,75,73,74,20,75,-1,7B
1160 DATA 16,73,65,20,44,4F,53,20,76,65,72,73,69,6F,6E,20,32,-1,AB
1170 DATA 17,2E,30,30,20,6F,72,20,6C,61,74,65,72,0D,0A,24,-1,97,-1
```

MOVEALL: Star-Dot-Star's program-creating program X-MAKER.BAS configured to create MOVEALL.COM

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According to IRS regulations, anyone who uses a computer for both personal and business purposes must keep contemporaneous records to document deductible expenses. You can buy any of several utility programs that monitor PC usage, but you can also accomplish the task with the short batch file USELOG.BAT.

USELOG.BAT relies heavily on DOS redirection capabilities. It requires that you first create a file called CR.DAT and keep it on disk so DATE and TIME commands can be redirected. To create CR.DAT, type **COPY CON CR.DAT** **<Enter>**, press **<Enter>** again, then **<Ctrl>-Z** and **<Enter>**. Be careful when creating USELOG-.BAT from the published listing; the presence and placement of many characters are critical. This is especially true for the greater-than and less-than symbols; if you omit one where two are required, the contents of the master file may be erased each time USELOG.BAT is run.

(continues)

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CDW 0886 PCW

Circle 91 on reader service card

```
echo off
cls
rem Note: Requires file CR.DAT containing 1 blank line
date <cr.dat >>uselog.dat
time <cr.dat >>uselog.dat
cls
echo Purpose: >>uselog.dat
if X==%1X goto cont
echo Updating usage log...
echo %1 %2 %3 %4 %5 %6 %7 %8 %9 >>uselog.dat
goto end
:cont
echo Describe the purpose of this computer session,
echo then press Ctrl-Z and then press ENTER:
copy use log.dat+con uselog.dat/b >nul
:end
```

USELOG.BAT: Batch file instructions to maintain log of computer activity

You can invoke the program in two ways: Type USELOG followed by up to nine words that describe the purpose of the computer session. (Do not use the greater-than or less-than symbols in your description.) Or simply type USELOG and await prompting for a description. If you opt for the latter method, you must remember to press <Ctrl>-Z followed by <Enter> to mark the end of the description. (Alternatively, you could use the KEYLINE.COM program [*.*, *PCW*, June 1986] to accept one line of keyboard input.)

When it is run, USELOG.BAT appends the date, time, and session information to the master file USELOG.DAT. The program performs with acceptable speed on a floppy-based system and executes in a flash when run on a hard disk. If you have a RAM disk, you may want to modify USELOG.BAT to operate on RAM-based files, then copy the master file onto a hard or floppy disk. Once the program is working, you can easily document all your computer activity—including changing tasks after starting the PC.

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SSDD96 (P/N3404)	.92	.90	N/A
DSDD96 (P/N3405)	1.03	1.01	N/A
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* Bulk is (P/N3408) **Bulk is (P/N3409)

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In the example above, that's a difference of 265% in price for the very same diskette!

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Duplicator Product: This is a catch-all category. Some of it may be High-Clip Product, some ANSI spec, some cosmetically blemished, some garbage. Usually anyone who buys product in this class justifiably anticipates that 20 out of every 100 diskettes will not format properly.

Floor Sweepings: This is just plain "garbage". For example, the 5.25" SSSD diskettes that you see advertised for 39¢ are exactly that: garbage. No decent manufacturer has sold any 5.25" SSSD diskettes in several years. SSSD is the absolute bottom of the line in terms of quality. Most of the discount diskettes you see advertised are "floor sweepings"...bought up by brokers and passed on to the unsuspecting public by unscrupulous merchants who are simply out to make a fast buck.

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Well, I wish we had more space, but we don't.

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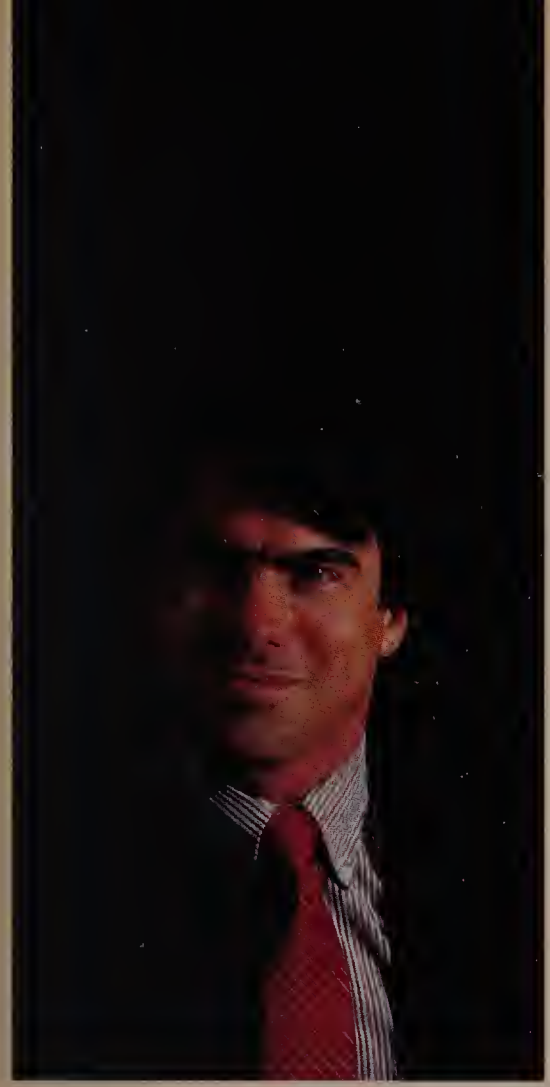

Kevin Strehlo

The Manager's Analyst

Self-awareness, arguably a manager's greatest asset, may be easier to learn when the teacher is an objective personality assessment program issuing counsel from a PC.

John Singleman didn't like what was happening in the central office where he managed the phone company's switching operations. A sudden increase in trouble calls from residential customers with advanced service had supervisors working 15-hour days, and the crisis was costing the company a fortune in overtime.

"We were experiencing lots of stress—all the symptoms of a situation out of control," recalls Singleman. Al Smith, the newest supervisor, was under the greatest pressure, and his department seemed to be at the core of the problem. Singleman wasn't surprised. He'd long had doubts about putting Smith in charge of the crew that entered orders for advanced residential services into the computers.

When Singleman went to investigate the problem, Smith couldn't come up with a coherent answer. He had, as Singleman told him, "collapsed like a phone system after a destructive earthquake. Al," Singleman continued, "it's like everyone's trying to find out what happened and all your circuits are swamped. Nothing's getting through."

Instead of prompting a laugh, the remark provoked an emotional outburst from Smith. Singleman decided he'd better take charge of the clamoring customers himself.

It didn't take long to discover that most of the complaints concerned the loss of all advanced services; a few callbacks to customers revealed that all had asked for the removal of one or two services—because call forwarding was no longer needed, for instance—just prior to losing everything. When Singleman found that the surge of trouble reports coincided with a new release of the advanced home services software, he figured he had the problem isolated, if not licked. A bug was erasing all advanced services when changes were entered instead of the few marked for removal.

Pending eradication of the bug, Singleman ordered Smith's crew to

(continues)

reinstall services that the customers wanted to keep.

The crisis soon abated, but Singleman still had to deal with Smith. In the years since he'd first attended a management seminar on personality assessment (and discovered to his surprise that it seemed to improve his own management techniques), Singleman had sent a number of his most promising new hires to similar meetings. Now, he had a new PC program called *Acumen*—a software version of traditional paper-and-pencil personality inventories, with extensive feedback on how a manager could improve his or her effectiveness. Singleman felt it was worth a try on Smith.

To prepare for the discussion with Smith, Singleman ran *Acumen* to update his own personality profile and to explore the roots of their communications problem. "Your subordinates are likely to see you as a tough, serious, results-oriented manager," the report said. "They are apt to feel that you are not particularly interested in them as people.... Even if many things are going well, you will tend to focus on the one thing that is not progressing up to your perfectionist standards."

Exactly, Singleman muttered. He called Smith into his office and presented him with a copy of *Acumen*.

Smith's initial skepticism had largely evaporated by the time he completed the 124 items on self-assessment and looked at *Acumen*'s analysis of his strengths and weaknesses as a manager. Singleman had told him that the program's publisher, Human Factors Advanced Technology Group of San Rafael, California, had based *Acumen*'s analyses on 250,000 profiles taken from 15 years of personality inventories. But Smith hadn't expected real insight from this or any other personality assessment program, whatever its basis.

What really convinced Smith, however, was what *Acumen* had to say about Singleman after he completed the 91-item assessment of his boss. *Acumen* pegged the contrary nature of their interaction precisely, clarifying the awful mess in which Smith found himself.

Acumen characterized Singleman as a results-oriented manager who was able to act decisively. It also called him impatient, inflexible, and prone to sarcasm, unaware of the impact of a flippant or thoughtless remark. Precisely, Smith thought, recalling how he'd felt when Singleman had compared him to a malfunctioning phone system after an earthquake. And Singleman was indeed a man who could, in *Acumen*'s words, "explain away any variety of issues with 'rational' explanations."

Viewed together, Smith's and Singleman's profiles were polar opposites. Smith was high in humanistic, helpful traits; Singleman scored near the bottom. In oppositional, confrontational tendencies Smith ranked low, while Singleman nearly went off the scale. Singleman was also extremely achievement oriented, while Smith ranked in the lower percentiles for this quality.

One of *Acumen*'s remarkably astute observations echoed what Smith had told his wife after a recent run-in with Singleman: "You may find it particularly unnerving," *Acumen* said, "to deal with aggressive individuals whom you find intimidating. In fact, some types of people may taunt you or 'test' you simply to see if they can upset your balance." That said it all about his relationship with Singleman, Smith mused.

Acumen's module on improving working relationships didn't offer much hope for resolving the problem—at least Smith didn't think so. The suggestions—to "not lose sight of the dignity and authority" that come with being a manager, and to be firm about channeling discussions toward an objective analysis of the facts—were good advice, but he wasn't sure he could put such nostrums into practice with Singleman continually cutting him down.

Perhaps I'm just taking the program's assessment of my management problems too seriously, Smith thought. But it was hard not to be upset. Sure, it said he had intuitive talents for getting along with others, and it acknowledged that managers who provided a supportive work environment—just what Smith did best—could be effective in getting subordinates to do good work.

(continues)

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```

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```
YOU GET DRUNK AND HAVE A TER-
RIFIC TIME FOR TWELVE MINUTES,
ARE THE LIFE AND SOUL OF
THE PUB, THEY ALL
CLAP YOU ON
THE BACK
```

```
>WRAP THE TOWEL AROUND MY HEAD
```

And the story responds:

```
THE RAVENOUS BUGBLATTER BEAST OF
TRAAL IS COMPLETELY BEWILDERED.
IT IS SO DIM IT THINKS IF YOU CAN'T
SEE IT, IT CAN'T SEE YOU.
```

```
AND
TELL YOU
WHAT A GREAT
CHAP YOU ARE AND
THEN THE EARTH GETS
UNEXPECTEDLY DEMOLISHED. YOU
WAKE UP WITH A HANGOVER WHICH LASTS
FOR ALL ETERNITY. YOU HAVE DIED.
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```
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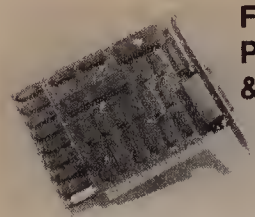

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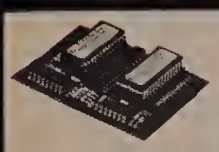

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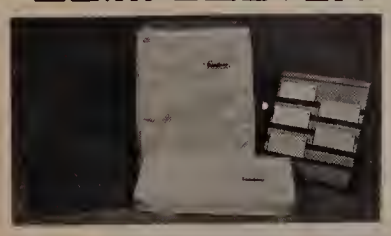

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[redacted]

But this wasn't going to work for him, *Acumen* advised. "This [supportive] management style is effective only when a manager provides subordinates with enough direction and structure that their work efforts can be coordinated efficiently. Since your tendencies are to look to others for direction and structure, there is a high probability that your attempts at managing tasks this way will be ineffective."

Smith spent most of the afternoon with *Acumen*. He worked through the interactive exercises for personal development, modification of specific behaviors, and improving management performance. He simply wasn't convinced that he could so completely alter his thinking, or that he wanted to. Why expend the energy to become an effective manager in a production environment, he wondered, when he could pursue a career in which his humanistic, supportive tendencies would be a real asset—in training, perhaps.

Acumen left Smith with a thought for the day: "It requires a very unusual mind to undertake the analysis of the obvious."

In the morning, Smith put in a request for a transfer to training. The move meant a demotion and a cut in pay, but he suspected it would make him happier. The news certainly seemed to make Singleman happy. And, Smith thought, the pay cut was worthwhile just to get that guy off his back.

(continues)

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Other managers who have used *Acumen* have been as impressed as Singleman and Smith. They say this approach works well with individuals like Smith who need a change but don't realize it. As the philosopher Schopenhauer put it—one of the program's thoughts for the day—"Belief is like love; it cannot be compelled; and as any attempt to compel love produces hate, so it is the attempt to compel belief which first produces real unbelief."

Getting people to believe in the validity of psychological assessments, PC-based or otherwise, is a perpetual problem. Some managers feel that relying on a program to provide instruction in the ways of management is more effective than having a supervisor counsel the same course—particularly when the program is insightful, nonjudgmental, and obviously unbiased.

An employee at one company came to believe through his *Acumen* assessment that his management style tended to produce stress-related illnesses, and that such managers often do not rise in their organizations. His supervisor shudders to think what the reaction would have been had he told the employee the same thing.

Partisans of *Acumen* say that even people whose personalities test as optimal for their respective situations can gain by better understanding what they do right. As another of the program's thoughts for the day puts it: "The most successful managers are not necessarily those who work hardest or longest, or even those who have the best financial or production skills. What determines success at the highest levels is self-knowledge—a manager's completeness as a human being."

Kevin Strehlo hunts for PC tales from an office overlooking Silicon Valley.

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- ☐ (2) Plan to buy—4-6 months
- ☐ (3) Plan to buy—7-12 months
- ☐ (4) Plan to buy—beyond 12 months
- ☐ (5) Reference only

5. For how many IBM PCs and compatibles do you buy products? (Include both company and personal units, please.)

- ☐ (A) 1
- ☐ (B) 2-4
- ☐ (C) 5-9
- ☐ (D) 10 or more

6. How much do you expect to spend in the next 12 months for peripherals and other add-ons?

- ☐ Less than $250
- ☐ $250-$499
- ☐ $500-$999
- ☐ $1000 or more

7. How much do you plan to spend in the next 12 months for software?

- ☐ Less than $250
- ☐ $250-$499
- ☐ $500-$999
- ☐ $1000 or more

8. How much do you plan to spend in the next 12 months for personal computers?

- ☐ (1) Less than $2500
- ☐ (2) $2500-$4999
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- ☐ (4) $10,000 or more

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September Preview

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- **Communications**
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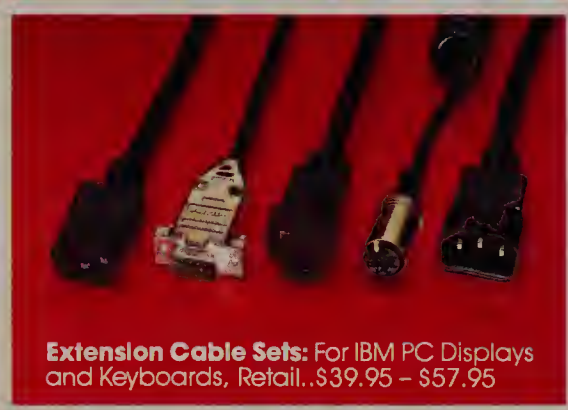

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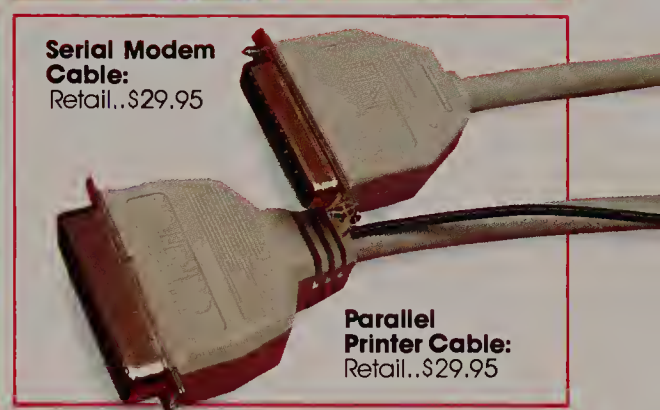

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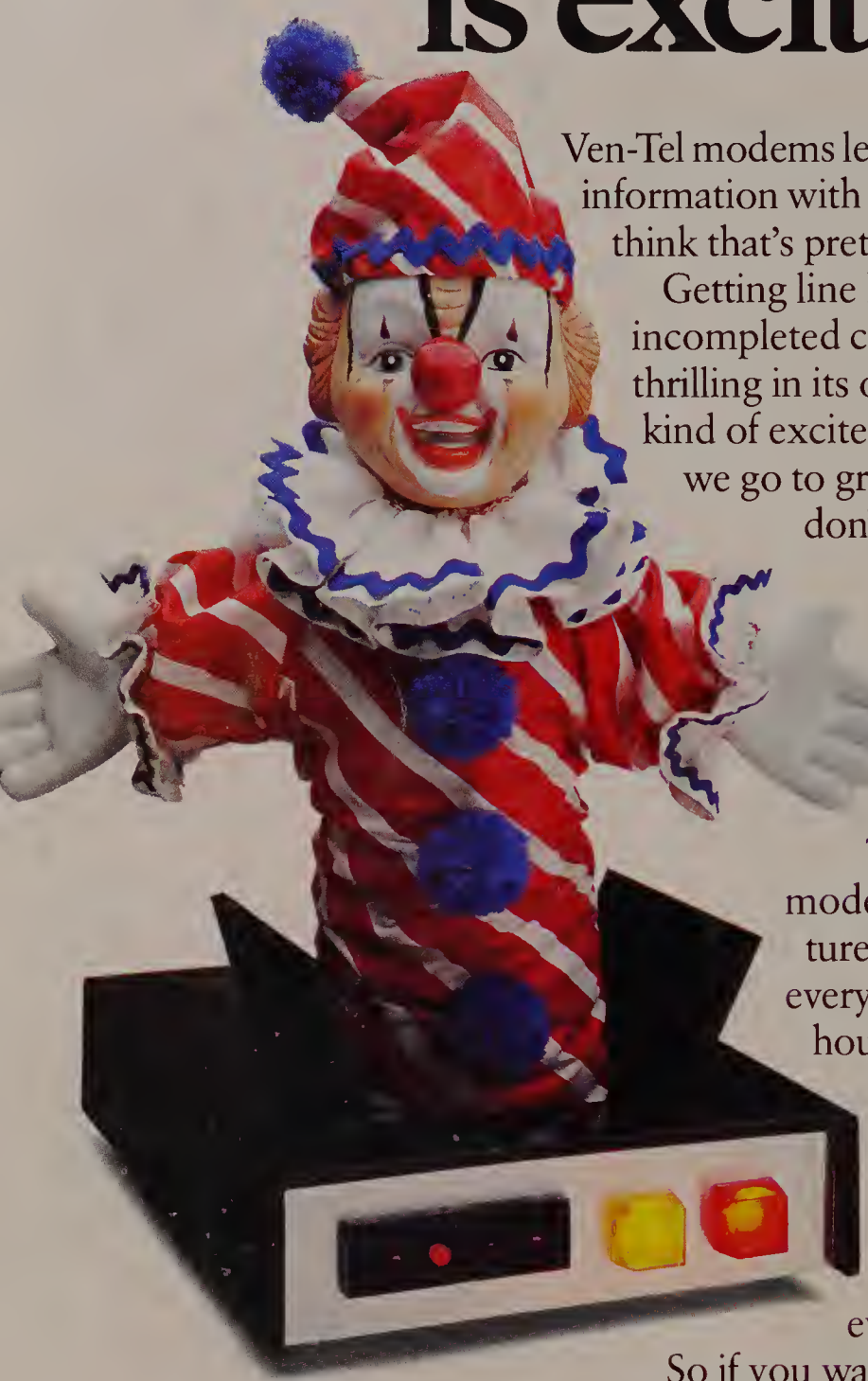

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